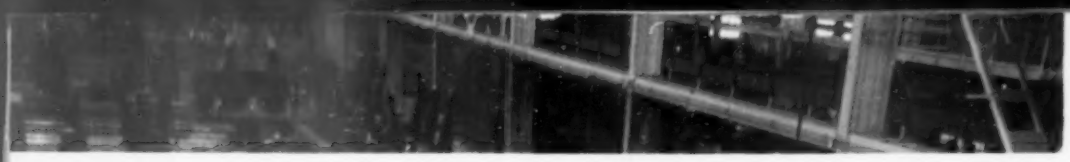


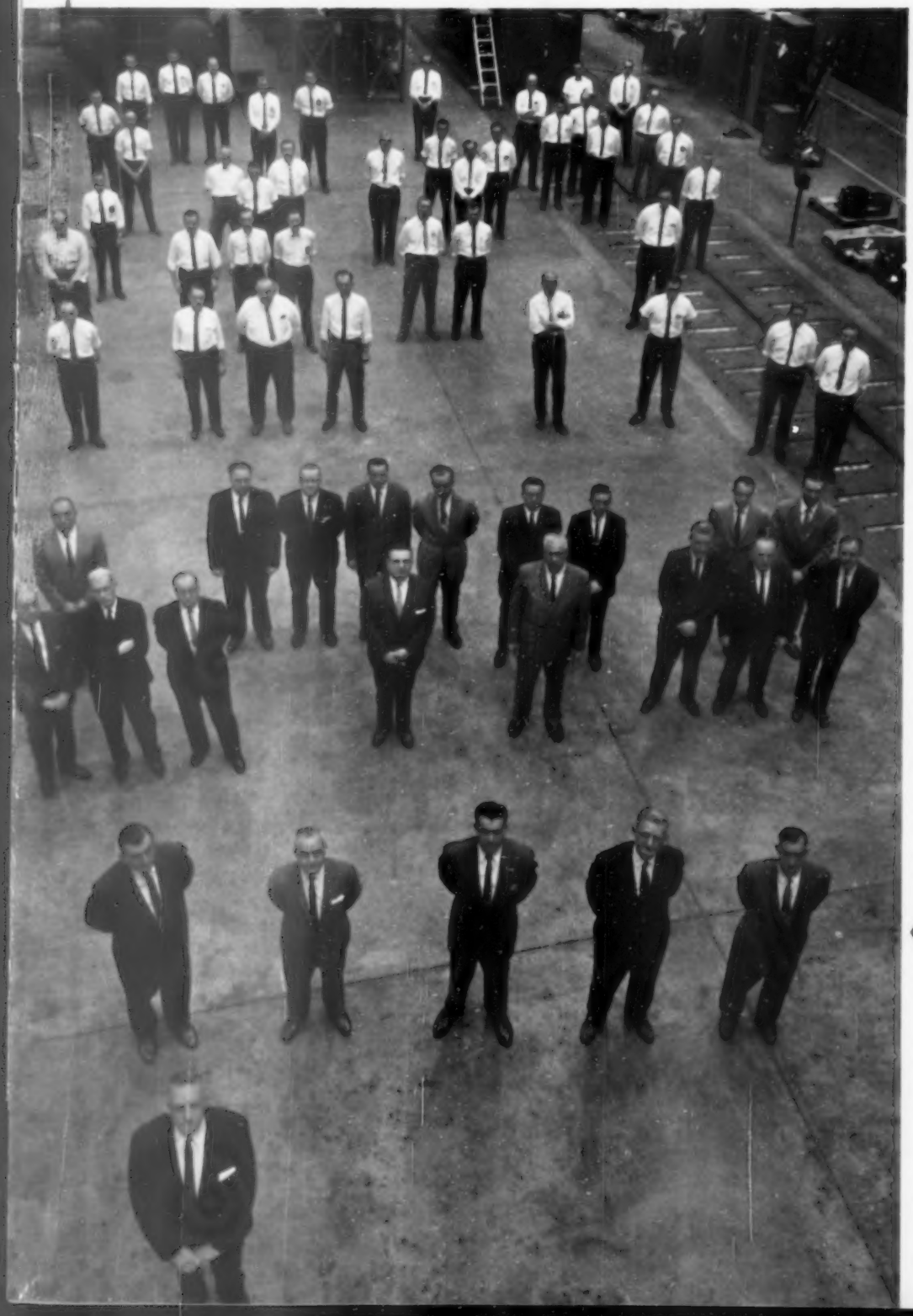
FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

FACTORY

june 1961

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION



GET READY FOR
STATIC CONTROL
p. 100

WAREHOUSE
OF TOMORROW
p. 104

POLITICKING
IN YOUR PLANT
p. 112

COVER STORY
STATUS IN
MANUFACTURING
ORGANIZATION
p. 86

TUNNEL-TYPE OVENS

BOTTOM-ENTRY-TYPE OVENS

ELEVATED "A"-TYPE OVENS

Batch-type ovens from DeVilbiss are your answer when you need fast, uniform baking, drying, dehydrating, preheating, or curing. They come knocked down or assembled in a choice of sizes, capacities, and heating media—to give you a "custom" oven at a standard price. DeVilbiss' engineering and experience assure the best oven—packaged or specially designed—for you.

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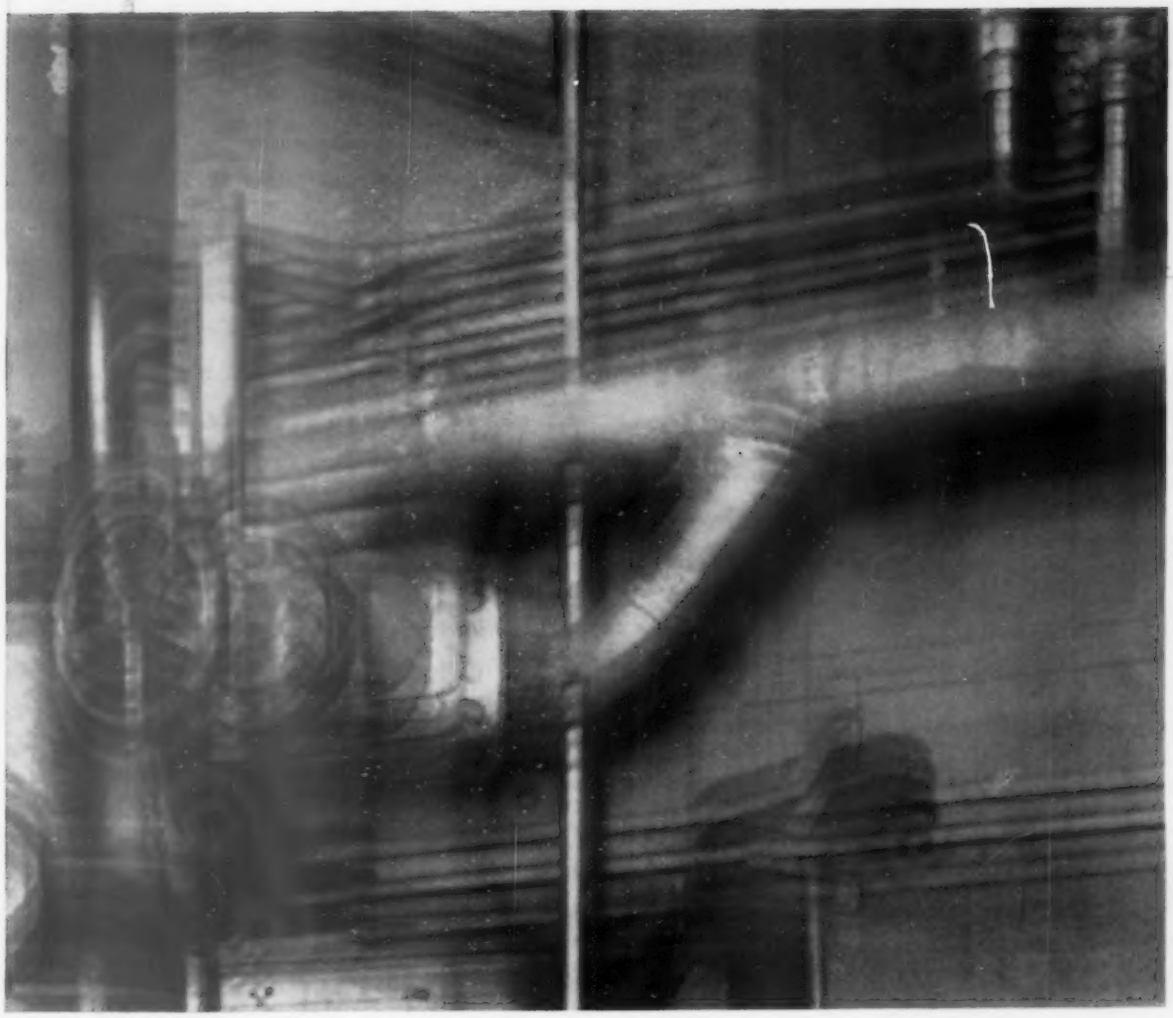
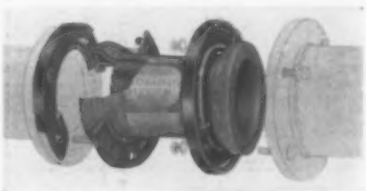
THE DeVILBISS COMPANY, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

For more facts circle 382 on READER SERVICE CARD



Tranquilizers for pipes that shake like this

HERE'S a sure cure for pipes that get rattled when the pressure's on. Install a B.F.Goodrich connector between the pipe and the pump. A connector is a short length of rubber hose used to join sections of pipeline. The soft, thick rubber absorbs vibrations. Cuts out banging and noise. Increases pump life, avoids costly broken connections.



In a midwest zinc plant, pipe on a hot acid line had to be replaced 2 or 3 times a year. Vibration from the pump shook the pipe until it banged, rattled, cracked. Then a short length of the lead pipe was replaced with a BFG Flexseal connector. Its cost $105. And it saved the customer $1000 in the first year alone by eliminating the cause of broken connections, frequent repairs, costly pipe replacements.

In addition to *Flexseal*, B.F.Goodrich has recently announced a new heavy-duty connector, called *Flexlock*, which is built to take working pressures up to 150 lbs. Both Flexseal and Flexlock are made with abrasion and acid-resisting rubber. Both provide full flow connections. Both can be ordered with or without wire reinforcement.

B.F.Goodrich distributors can give you complete details on B.F.Goodrich Flexseal and Flexlock connectors. And as factory-trained specialists in rubber products, they can answer your questions about any of the products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-122, Akron 18, Ohio.*

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FOR BETTER
• PLANT MAINTENANCE & ENGINEERING
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JUNE 1961

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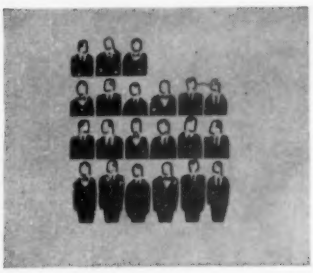

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Static control maintenance **100**
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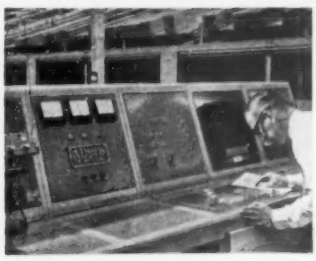
Do-it-yourself utility shelter **103**
Build a weatherproof dome in less than a day.



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COMING

Coming soon is one company's broadside at indirect costs. Plant management has long waged a battle against direct costs while allowing other costs to mount to staggering proportions. Now IBM has developed a system that will give you a way to stop this runaway waste. **In coming months** we'll also cut through the shibboleths of safety committees and tell you the only way you can really achieve plant safety.

COVER

These are the managers, engineers, and supporting personnel who work together to make Westinghouse Electric Corporation's large circuit-breaker plant at Trafford, Pa., one of the most efficient in the world. Photographed this way especially for FACTORY, these men dramatize the human talents that underly the lines and boxes seen on organization charts (such as their own, shown on page 96). The complete story of manufacturing organization today begins on page 86.

70TH YEAR OF PUBLICATION
JUNE 1961 Vol. 119 No. 6

Published monthly by McGraw-Hill Publishing Company, Inc. U. S. subscription rate for individuals in the field of publication: $2 per year; single copies: $1. Canadian and foreign rates on request.

Executive, Editorial, Circulation, and Advertising offices: McGraw-Hill Building, 330 W. 42nd St., N. Y.; second-class mail postage paid at Albany, N. Y., and at additional mailing offices.

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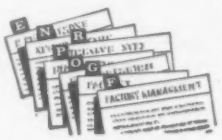
Turn the page for FACTORY's Problem-Solving Guide

PROBLEM-SOLVING GUIDE

Leads to read and save



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1. All major articles (set here in bold type) and many short items are classified according to a functional code. Codes cover basic operating responsibilities.

2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For ways to use your Guide, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

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Huge ram trucks stack aluminum ingots.

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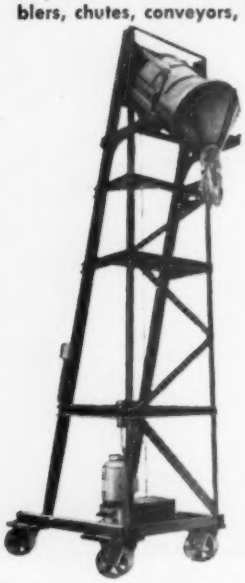

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1317 Willow Street, Los Angeles 13, Calif.

LETTERS

FACTORY helps an old friend win his degree

Dear Sir:

In my spare time I have been studying at Kent State University for a master's degree in business administration. I have decided to write my thesis on "methods and applications of statistical sampling methods in plant engineering functions."

I have been a constant reader of FACTORY for many years and I have quite a file of tear sheets. But I may have missed some on work sampling. Please send me a bibliography of FACTORY articles on this subject covering the past 10 years.

J. B. Koesterer
Manager, Maintenance Evaluation Engineering Services
The B. F. Goodrich Co., Akron, Ohio

► **The 10-year list includes 14 articles.—ED.**

Maintenance costs and plant investment

Dear Sir:

I'm evaluating maintenance performance in our company and would like to compare it with other plant operations in the chlorine-caustic industry.

Do you know where I could obtain a ratio of maintenance costs to plant investment for these plants?

James W. Tracht
Assistant Chief Engineer, Maintenance Section
Pennsalt Chemicals Corp., Philadelphia

► **Our study "What Industry is Spending Today for Maintenance" (February 1959, page 72) will help you. Also, the U. S. Department of Commerce recently issued a report, MC 58 (1)—D11-1, which includes an analysis of the cost of maintenance and repair in industry for 1957.—ED.**

Computer development and application

Dear Sir:

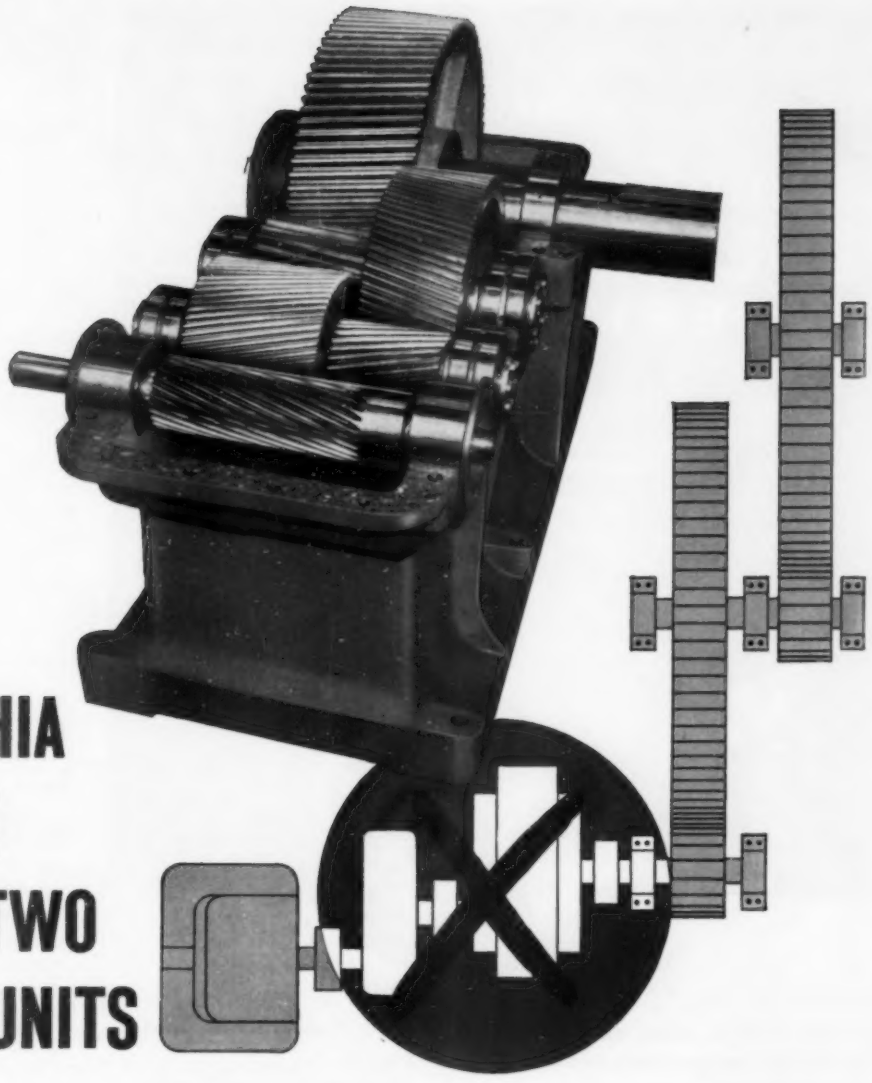
We are concerned with the development of computer applications for engineering change control and therefore found FACTORY's article on controlled plant information (August 1960, page 60) particularly interesting. This article said computers can even tell you the best time and place to incorporate new engineering changes into a product line.

Can you give us the name of any company which has developed computer programs for the determination of change incorporation points, and tell me for which computer these programs have been developed?

G. R. Walker
Operations Engineering, Western Electric Co.
Burlington, N. C.

► **IBM has a proven computer program for its 305 "Ramac" and Burroughs is able to do it with the B-205 and B-220.—ED.**

Turn the page



ONE PHILADELPHIA MILL DRIVE REPLACES TWO STANDARD UNITS

This 1250 HP Philadelphia Precision Ground Helical Gear Drive takes the place of separate high speed and intermediate speed reduction units. Radically improved gear accuracies reduce dynamic load factors . . . gearing has increased load carrying capacity. Result: you can save space, increase speeds, transmit more power and get longer gear life.

Philadelphia precision ground gearing for high-speed, heavy-duty applications like this is the most important advance in power transmission in the last decade. So advanced in fact, that conventional standards of gear accuracy are suddenly out of date. It is a major breakthrough that can solve drive problems that could never be solved before . . . because you get engineering advantages that were never available before.

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*** DURO / TRED** T.M.

Wheels are composed of the new miracle *polyurethane* elastomer bonded to a lightweight, rugged core.

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Evansville 7, Indiana

Branch Offices in principal cities; see the Yellow Pages of the telephone book under "Casters". Canada: Stratford, Ontario.

NOELTING Faultless Casters

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Begins on page 6

LETTERS

Site selection

Dear Sir:

We would like to obtain 125 reprints of "Plant Site Selection Guide" (FACTORY, May 1957, page 180). It has been highly recommended to us and we would like to include it in a small industrial development manual now being prepared. We intend to distribute this manual at an Industrial Development Workshop sponsored by our Association in San Antonio, Tex.

Thank you very much for your assistance.

J. D. Brown
American Public Power Assn.
Washington, D.C.

Old article still good

Dear Sir:

I would like you to know that while recently serving on a task group studying factory maintenance and costs I came across your very excellent article, "What Industry Is Spending Today for Maintenance" (FACTORY, February 1959, page 72).

J. E. Scranton
Industrial Engineering
Canadian Westinghouse Co., Ltd.
Hamilton, Ont.

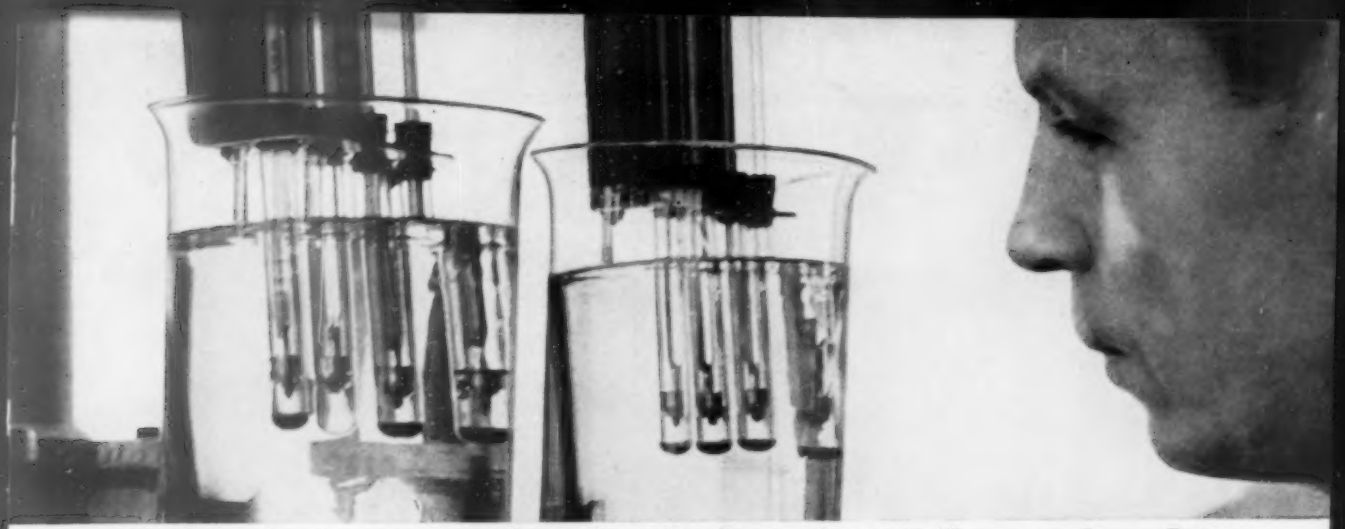
Stimulating the economy

Dear Sir:

Is it possible to obtain 100 reprints of "How to Beat Foreign Competition" (March 1961, page 78)?

I'm an avid reader of your magazine and I want to dis-

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from let) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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THIS IS ROLLER DIE CUTTING

HAVE YOU HEARD ABOUT IT?

ROLLER DIE CUTTING IS THE NEWEST, MOST PRACTICAL METHOD YET DEVISED FOR DIE CUTTING AND TRIMMING PARTS FROM SHEET OR ROLL STOCK

Roller Die Cutting is a relatively new process developed by **FEMCO** for automatically die cutting or trimming specific shapes and sizes accurately and economically from almost any type of material.

On a **FEMCO Roller Die Cutter** inexpensive steel rule dies are mounted in vertical or horizontal die handling mechanisms and cutting is done by a traversing steel roll which passes over the dies compressing them against the stock.

Cutting pressure is applied to the dies progressively. Only the tangent point of the roll exerts pressure across the face of the dies. This permits the application of tremendous pressure at the point of cutting without any pressure on the rest of the die. The result — longer die life and greater production capacity from a relatively small and inexpensive machine.

FEMCO has developed many variations of its basic **Roller Die Cutter.** Chances are one of these is suitable for your die cutting operation. If not, **FEMCO** will be glad to work with you to develop a variation of its **Roller Die Cutter** to meet your specific needs.

HERE ARE SOME OF THE MATERIALS NOW BEING CUT ON A FEMCO ROLLER DIE CUTTER! . . . . . .

- MOLDED RUBBER PRODUCTS
- SHEET RUBBER
- FOAMED PLASTICS
- VACUUM FORMED PLASTICS
- CORRUGATED BOX BOARD
- CORK
- TEXTILES
- CURLED HAIR
- ABRASIVES
- FIBERGLAS
- FOILS
- VINYL SHEETING
- OPEN & CLOSED CELL SPONGE RUBBER
- HEAVY PAPER

FEMCO

The **FALLS ENGINEERING and MACHINE Co.**

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Begins on page 6

LETTERS

tribute these reprints to customers. It may help create the stimulation we need to push the economy up to where it should be.

B. J. Small
President
United Machinery Sales Co.
Chicago

Hidden surveys found

Dear Sir:

I'm looking for an index with which to evaluate the number of engineers required to service our food, paint, and chemical plants. I would appreciate any assistance you can give.

J. R. Crotty
Maintenance Engineer
General Engineering Dept.
The Glidden Co.
Cleveland

► **FACTORY has published two surveys that may help: "Manpower Yardsticks," September 1957; Maintenance Management Practices Today," October 1958.—ED.**

FACTORY

June 1961 Vol. 119, No. 6

A consolidation of Factory Management and Maintenance and Factory and Industrial Management, including Factory, and Maintenance Engineering. Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Executive, Editorial, Circulation, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N.Y. Telephone: Longacre 4-3000. Teletype: TWX N.Y. 1-1636. Cable address: McGRAWHILL, N.Y.

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CUT SWEEPING COSTS WITH THIS MAINTENANCE-FREE SWEEPER

engineered so the Maintenance Department can Add to the Net Profit of your company!

An 18 HP, 2-cylinder, 4-cycle gasoline engine powers the all-new 4400 sweeper. Two speed transmission. One foot pedal controls forward, reverse and hopper dump. Heavy duty drive chain runs in oil—permanently sealed. Self-adjusting idler pulleys. Operator controls pressure of full floating main broom and side brushes. Exclusive 12-bag filtering system. Covers a minimum of 120,000 sq. ft. per hour.

- Variable Speeds
- Sweeps 68" path
- Holds ½ ton

TOUGH...POWERFUL...DEPENDABLE

Rough treatment and constant use won't hurt this solid steel "baby." The Wilshire 4400 is plenty rugged, yet simple to operate and fully maneuverable even in crowded areas. Insist on a competitive demonstration before you buy. For guaranteed machine amortization, specify the new Wilshire 4400—*tops in power sweepers!*

SEND FOR PROOF TODAY!

LINCOLN

LINCOLN Floor Machinery Co. and WILSHIRE Power Sweeper Co.

divisions of AMERICAN-LINCOLN CORPORATION

WILSHIRE POWER SWEEPER CO., Dept. F-561, Toledo 2, Ohio

Please rush literature and specifications. ☐ We would also like to have a free demonstration.

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Company_____

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GOODYEAR

EXCLUSIVE! GOODYEAR GREEN SEAL V-BELTS

to give you sets that are precision-matched in length to outperform...and outlast...all others

At no extra cost, GREEN SEAL *V-Belts also give you:*

Dimensional stability throughout the life of the belts via highly shrink- and stretch-resistant 3-T Process Cord or airplane-type steel cable.

Protection against dampness through special mildew-inhibited rubber compounds.

The most complete line of V-Belts in the industry—easily and quickly available through our nationwide network of distributors.

Still another "plus": The G.T.M.—Goodyear Technical Man—is available to help you select the right belts for any drive.

For your best buy in multiple drive belts—including new money- and space-saving HY-T Wedge V-Belts—look to Goodyear. Also, get the full story on P.D. (positive drive) Belts and Variable Speed Belts from your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from

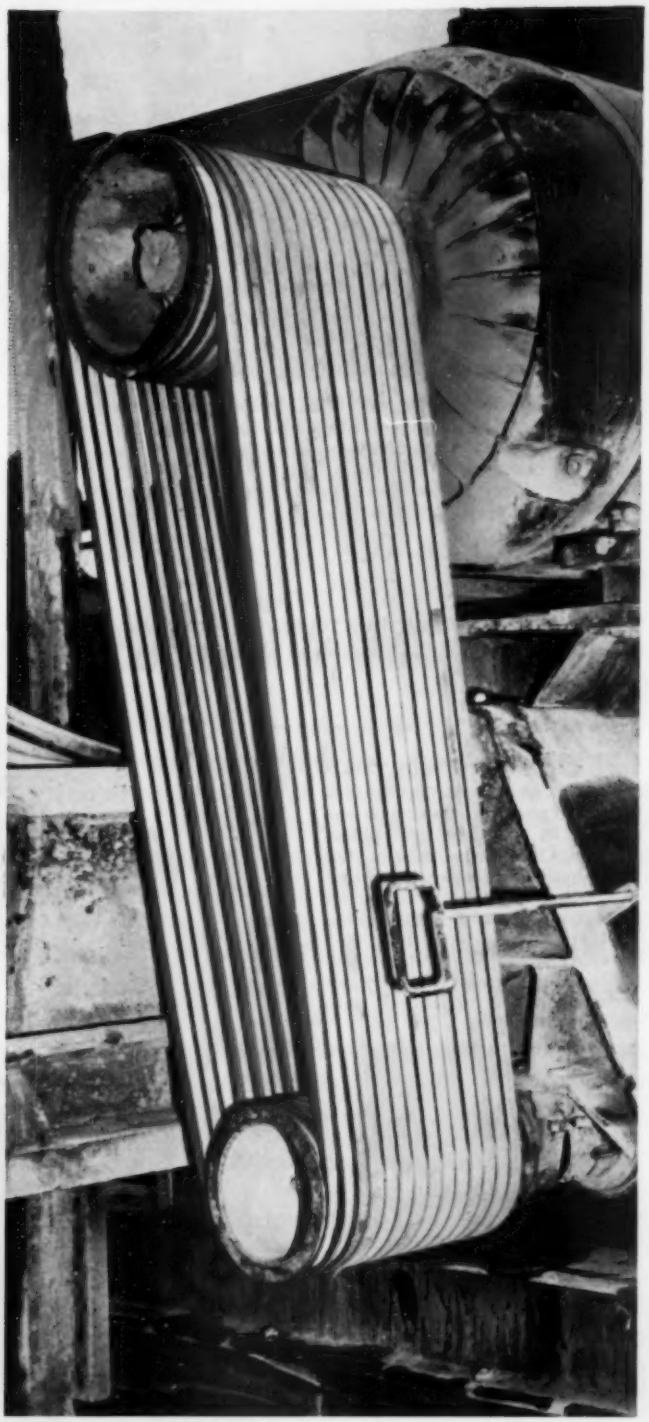
GOODYEAR

INDUSTRIAL PRODUCTS

Compass, Green Seal, Hy-T, P.D.—T.M.'s
The Goodyear Tire & Rubber Company, Akron, Ohio

CODES TO 1/32"...

Length-coding GREEN SEAL V-Belts to 1/32"—not just 1/10" like most belts—takes this ultra-precision machine. *Only* Goodyear has this type of equipment, which is set by means of fine-tolerance steel templates to insure accuracy.



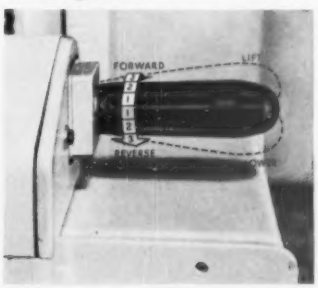
Harnessing this big, 22-saw stonecutter for 3 full years required COMPASS-V-Steel Belts by Goodyear. Over this period, the Goodyear belts helped carve up 20 tons of rock a day—over 15,000 tons in all. Normal V-belt life in this type of rugged service is a scant 6 months.

New

BATTERY REMOVAL TOP OR SIDE. Battery mounted on rollers may be removed from either side. Steering wheel and Quadtrol controller swing back to allow overhead removal or servicing of battery. Takes just seconds. Battery compartment space is extendable to accept a wide variety of battery sizes.

CHANGE FROM AUTOMOTIVE TO REVERSE STEERING IN MINUTES by changing position of two bolts.

SAFE DRIVING IS "BUILT-IN." Controls are electrically interlocked to prevent starting or reversing in any but first speed position. Current is disconnected when hydraulic brake is applied and truck cannot be restarted until controls are returned to first speed position. Lift and lowering speed is infinitely controlled by manually operated hydraulic valve for smooth, safe handling of loads.



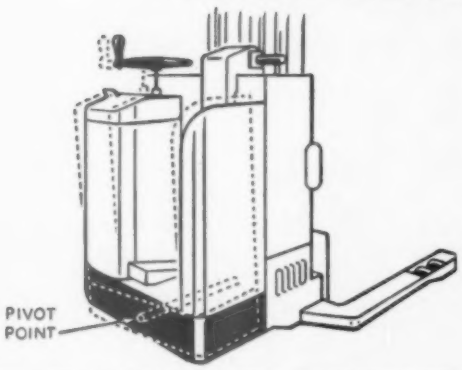
QUADTROL COMBINES SPEED AND LIFT CONTROLS IN ONE UNIT FOR EASIER DRIVING. Control of three speeds forward and reverse plus lifting and lowering of the forks is unified in one handle. Operator has full control of truck and load at all times because his hand need never leave the control. The horn button can be actuated by thumb while hand operates Quadtrol. Driving is smoother, safer and maneuvering is faster because the driver can easily control lift and travel functions simultaneously.

CASTER MOUNTING LENGTHENS TIRE LIFE. Caster is dual-wheel type, ball-bearing mounted, articulated on pivot spider which equalizes load on wheels and instantly responds to swivel action. Entire caster unit is mounted on a rocker assembly, resulting in a smooth change in direction and longer tire wear.

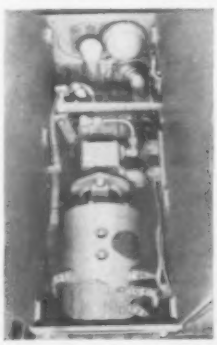
MODEL VST CAPACITIES: 2000, 3000 AND 4000 LBS.

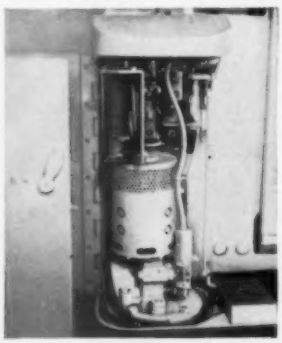
feature-packed AUTOMATIC® Transveyor

drives better, services easier, works longer



KNEE ACTION FRAME ASSURES STABILITY UNDER ALL CONDITIONS. Straddle arms pivot independently of drive unit, preventing frame distortion and instability on uneven floors. Traction is improved because all wheels are always in contact with floor.





ACCESSIBILITY OF PARTS SIMPLIFIES SERVICING. Rear cover swings out to put drive motor, electrical components and brake within easy reach for servicing. Hydraulic components are readily accessible with battery removed. Note short, direct hydraulic lines which increase efficiency and lessen need for maintenance.

AUTOMATIC Transveyor Model VST has set a new standard for easy driving, serviceability and lower operating cost for narrow aisle equipment. Its simplified design substitutes a single operating lever for a whole cluster of controls. A compact, easily accessible hydraulic system makes servicing a snap. Battery can be removed from either side of truck or by an overhead chain hoist in a matter of seconds. The knee action frame permits all wheels to contact the floor at all times, insuring maximum stability. These are just a few of the features that enable the Model VST to work harder, longer, at a lower operating cost. Model VST is available in 2000, 3000 and 4000 lbs. capacities. Get all the facts—mail coupon today.

AUTOMATIC

AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Manufacturing Company
39 West 87th Street, Dept. H1, Chicago 20, Ill.

Send for full details NOW!

☐ Please send complete specifications and feature data on new Model VST Transveyor.

☐ Please send "NEW DIMENSION" booklet which discusses narrow aisle truck applications and available types.

☐ Please have your representative call me.

Name_____ Title_____

Company_____

Street_____

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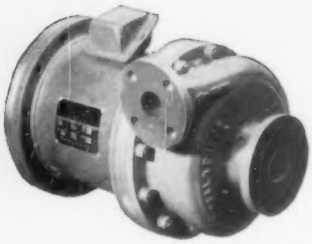
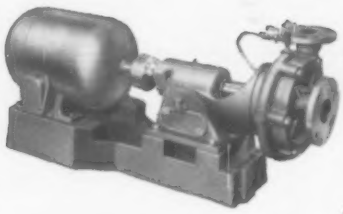
For more facts Circle 392 on Reader Service Card

DON'T LET CORROSIVES CREATE A PUMPING PROBLEM



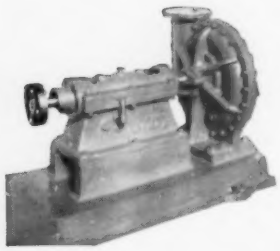
HERMETIC PUMPS

. . . a new design for use where leakage would be costly or dangerous. They will not leak! Wear compensating bearings take up thrust loadings. Available in a variety of materials of construction. For pressures up to 400 psi.



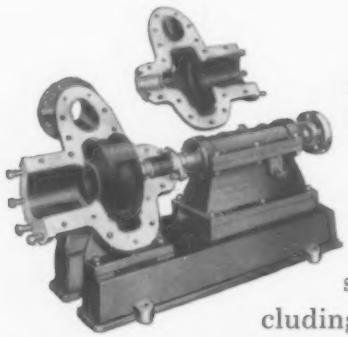
SPECIAL ALLOY PUMPS

. . . of single-suction ball bearing type, capable of handling your toughest liquid moving job. Materials of construction include Hastelloy B or C, nickel, bronze, lead, stainless, just about any material that can be cast and machined. Capacities to 1100 gpm, head to 360′.



HARD LEAD PUMPS

. . . with vertical split housing. All components exposed to liquid are of hard lead. Typical 'Buffalo' heavy-duty construction throughout. Built in capacities to 600 gpm, heads to 120′. Details available on request.



RUBBER LINED PUMPS

. . . offered with various types of rubber from soft to hard, including neoprene with high graphite content. Diagonal split housing for ease of maintenance. Piping need not be removed for inspection of rotating parts. Single and double suction models.

For more detailed information on 'Buffalo' pumps for industry, contact your resident Buffalo Engineering Representative or write direct.

"Buffalo" PUMPS

BUFFALO PUMPS DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canada Pumps Ltd., Kitchener, Ontario

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

M

May we introduce ourselves...

AMERICAN

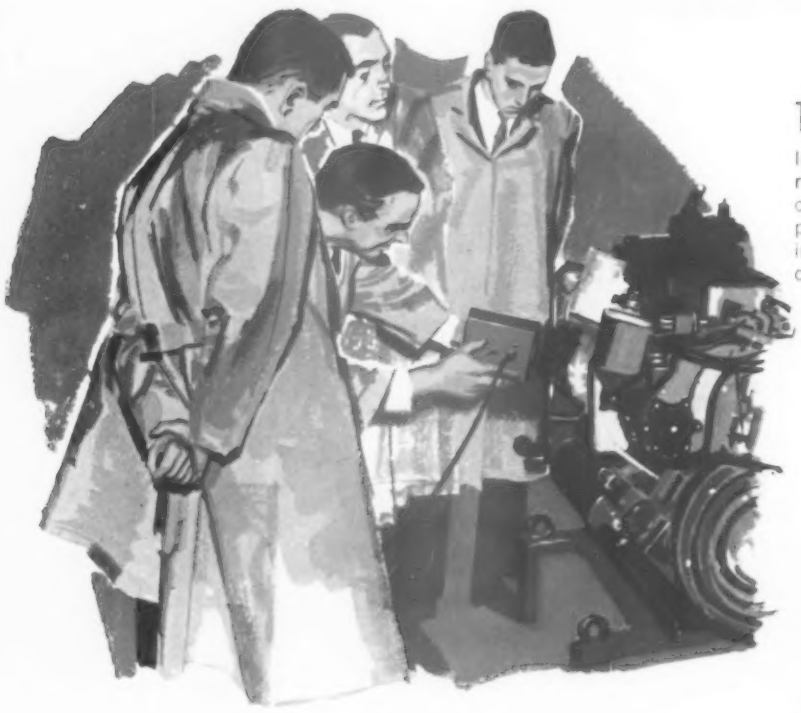
American Oil Company is our name. Our organization has more than 70 years' experience in the oil business. We are one of the largest petroleum organizations in America. We believe the experienced American Oil representative who calls on you, plus the products and facilities which he has at his disposal, are reasons why you will like to do business with us.

The American Oil Company representative that calls on Industrial and Fleet customers has many years of experience in this work. Because of this experience and background, he knows your petroleum product needs. He has more than 2,000 products with which to fill these needs.

Meet your American Oil representative...

SPECIALISTS back-stop representatives

In the American Oil Marketing Technical Service Department are specialists who are recognized authorities in their fields. These senior consultants may be called in to work with you on any specialized problem you may have.



TRAINING at American's Sales

In our Sales Engineering School your
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of instruction he is given basic infor
phases of petroleum product quality and
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course and then again for post-graduat

RESEARCH

Our research center adjacent to our refinery at Whiting, Indiana, is one of the largest in the world. More than a thousand research scientists and technicians are at work here developing new products and finding ways to improve present products. Their mission: To help your American Oil representative help *you* lower your maintenance costs and stretch your maintenance dollars.

es Engineering School

our American Oil rep-
In concentrated courses
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and application. Accord-
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This is AMERICAN OIL COMPANY

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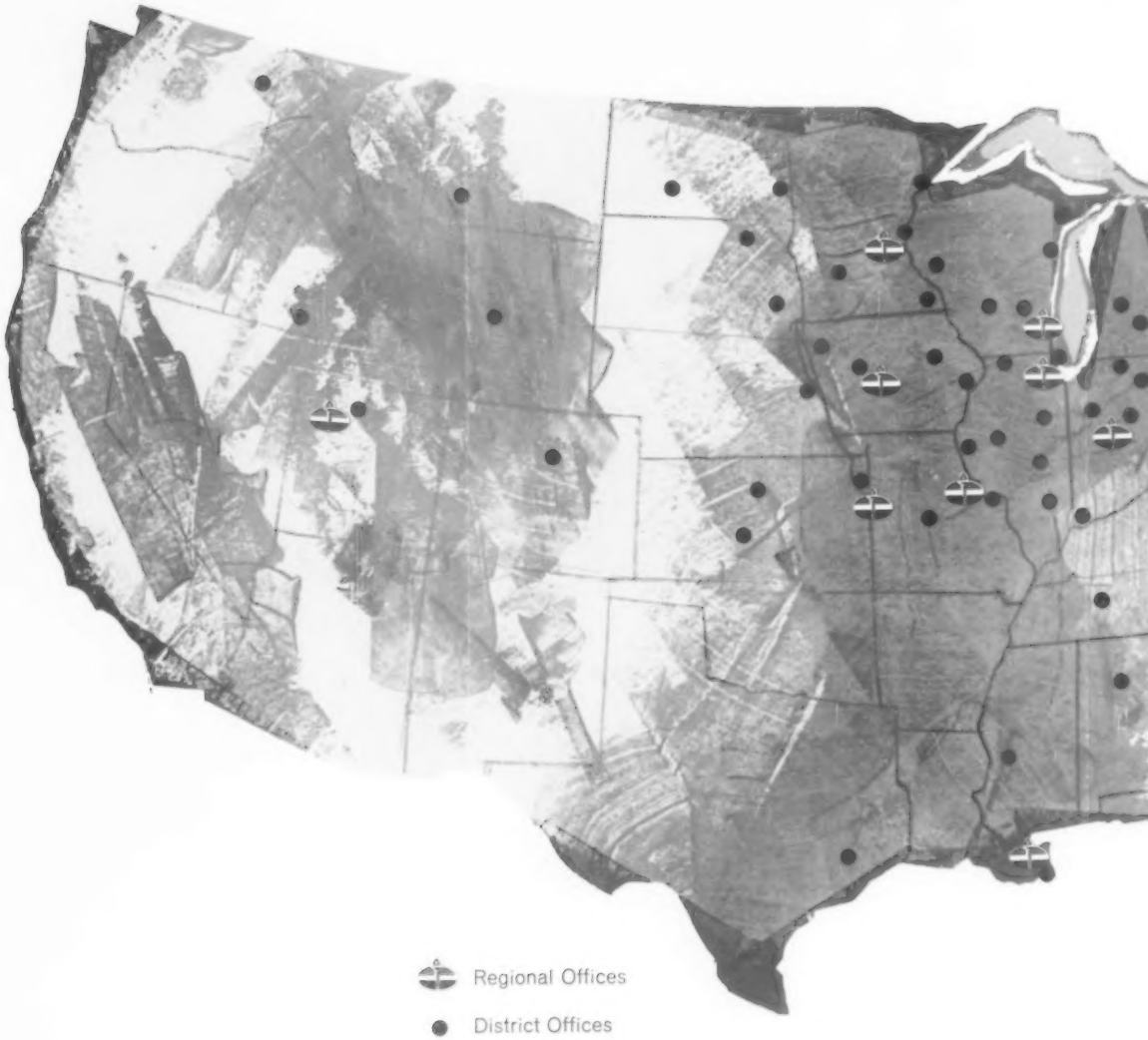

Your representative is always ne

American Oi
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AMERICAN OIL COMPANY

Speed and flexibility of service begin at the refinery

Twelve American Oil refineries give flexibility to production, make it possible to assure prompt delivery. Our 2,875 miles of product pipelines augment delivery facilities.

nearby

Oil representatives operate District Offices. Thirteen Offices strategically located ıt the country lend support t Offices. An American Oil representative is only a tele- l from your office. The prod- need for your plant or fleet able from upwards of 4,100 ses and distribution points d to provide quick delivery.

PRODUCTS available from American Oil Company

Your American Oil representative has a line of more than 2,000 products. Here are some of his most important ones . . .

Metal Refining and Metalworking Industries	**AMOCUT Oils** Cutting oils for every type of machining operation.
	AMERICAN Industrial Oils Lubricating oils for many purposes.
	AMOCOOL HD Soluble Oil Heavy-duty soluble oil.
	RYKON Greases For every grease-lubricated bearing.
	Anhydrous Ammonia & Nitrogen Solutions
Mining Industry	**AMERICAN Diesel Fuel** Premium quality, multi-purpose.
	AMERICAN HD-M, S-1, S-3 Motor Oils Heavy-duty motor oils.
	AMERICAN Industrial Oils For general mine lubrication.
	AMERICAN Regular Gasoline For heavy-duty operation.
	AMOVIS Lubricants For gears and cables.
	RYKON Greases For every grease-lubricated bearing.
Dairy Industry	**ESKAR Dairy Waxes** Premium quality dairy waxes.
Process Industries Chemical Food Paper	**AMERICAN Industrial Oils** Circulating compressor and hydraulic oil.
	AMODRIP Oils Premium quality dripless oils.
Process Industries *(continued)*	**ESKAR Waxes** All-purpose paper-coating waxes.
	RYKON Greases For every grease-lubricated bearing.
	Anhydrous Ammonia & Nitrogen Solutions
Power Generation	**AMERICAN Diesel Oils M** Premium "MIL" diesel lubricating oil.
	AMERICAN Diesel Fuel Clean-burning premium diesel fuel.
	NONPAREIL Turbine Oil Guaranteed for the life of the turbine.
	AMERICAN D&G Oils Premium S-1 level lubricating oil for diesel and gas engines.
Truck, Bus and Construction Equipment	**AMERICAN Diesel Fuel** Clean-burning premium diesel fuel.
	AMERICAN HD-M, S-1, S-3 Motor Oils Heavy-duty motor oils.
	AMERICAN Regular Gasoline For heavy-duty operation.
	AMOCO Lithium Multi-Purpose Greases All-purpose greases.
	Super PERMALUBE Grease Anti-rust, high-load carrying chassis grease.
Railroads	**Diesel Fuels and Lubricants**
Fertilizer Manufacturers	**Anhydrous Ammonia & Nitrogen Solutions**
For Road Construction and Industry	**Asphalt Products** Complete line.

And for fleet men,

AMERICAN'S outstanding Truck Stop Program

A network of more than 170 American Oil Truck Stops serve fleet operators. Twenty-four hour service, repair services, simplified bookkeeping and other advantages come to fleet men who route their trucks to these stations.

AMERICAN OIL COMPANY

910 S. Michigan Ave., Chicago 80, Ill.

FOOD FOR THOUGHT

food fit for a king... from a machine

Good food is only one reason why

many companies are switching to automated food service

Americans' eating habits are changing. Shorter mealtimes are becoming the rule. There's a tendency to more snack-type eating at odd hours.

The ordinary solution to personnel and transient feeding—the leased or wholly owned cafeteria—provides only limited hours of service, and requires appreciable investment in space, man-hours and equipment.

These are some of the reasons why more and more factories, schools, offices and institutions are supplementing or replacing facilities with Canteen® *automated* food service.

Canteen vending machines serve tasty, wholesome hot and cold foods, planned by dietitians for nutrition and appetite appeal. Snacks, hot and cold beverages, candy, cigarettes, as well as hot and cold meals, are immediately available day or night.

No wonder people like Canteen service. The food is appetizing—menus varied. There's no waiting in line, no crowding. And they can get service whenever they want it.

Management avoids the overhead costs involved in manual food preparation and service.

Canteen automated food service is available only from Automatic Canteen. It's nationwide, locally operated and managed, thoroughly reliable. For the whole story, call your Canteen representative today. You'll find his name listed in the Yellow Pages of your phone directory. Or mail the coupon for complete information.

DELICIOUS SNACKS AND COMPLETE MEALS, *prepared for modern tastes, are available from Canteen machines.*

AUTOMATIC CANTEEN

AUTOMATIC CANTEEN COMPANY OF AMERICA

Food Service Division
AUTOMATIC CANTEEN COMPANY OF AMERICA
Merchandise Mart Plaza
Chicago 54, Illinois

Gentlemen: I'm interested in knowing what Canteen automated food service can do for us. Please send complete information.

Name_____

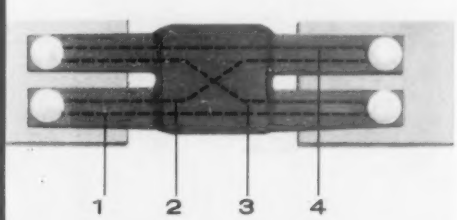
Address_____

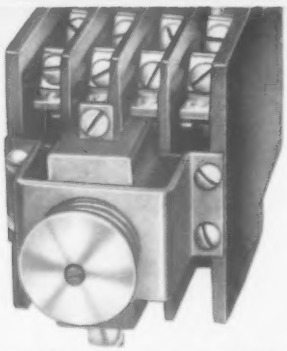
City_____ Zone____ State_____

For more facts Circle 395 on Reader Service Card

Another Cutler-Hammer first! Up to 24 poles in an area less than the size of a dollar bill.

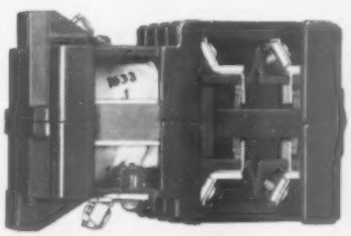
New contact reliability. Parallel bifurcated contacts, which allow four current paths instead of one, provide infinitely greater circuit reliability . . . liberally designed so any current path carries full relay rating.





At last! "Mechanical memory" latch as reliable as the relay itself! No adjustment ever needed. Add latch at any time.

New simplified design! Cutaway view shows basic simplicity. Coil vacuum impregnated to resist damage from humidity, vibration, electrical stress. Terminals can be screw or spade type.



Space savingest relay you've ever seen: New Cutler-Hammer "Compact 300"

Versatile 300 V. control relay is so reliable it's permanently sealed!

Here is the best answer yet to the need for an extremely reliable, small-size 300 V. industrial relay—the new Cutler-Hammer "Compact 300."

Every detail known that affects relay reliability has been improved in the "Compact 300." Bifurcated contacts which make possible *four* current paths rather than one, add millions of operations to the "Compact 300's" electrical reliability.

In fact, we're so confident of its electromechanical reliability, we permanently enclose the "Compact 300." And, if it should be damaged by a fault current, you throw it away and replace it with a new one. Its low price makes this an economical, practical maintenance procedure.

Now think of the space you can save with the "Compact 300." It controls up to eight circuits in panel space only 2″ wide by 2¾″ high. 2, 3, 4, 6 and 8 poles with any combination of N.O. or N.C. contacts are available, of course.

At any time, you can add "mechanical memory" latch with a life equal to the life of the relay. No adjustments are ever necessary. It's another exclusive! Better get full details on the new "Compact 300" now. Send for Pub. ED-L0-79-L211.

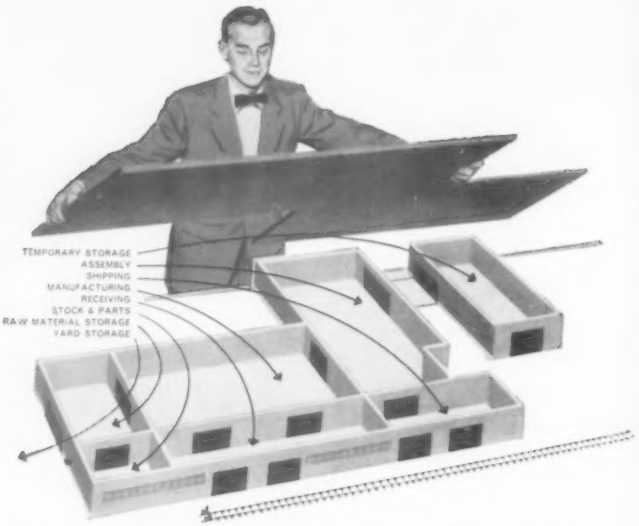
What's new at Cutler-Hammer? New, better products, like the 300 V. relay are coming steadily from our new, expanded plant facilities. We're ready now to help you take care of the great industrial growth of the future. If you are planning ahead and need electrical control assistance, contact the nearest Cutler-Hammer sales office.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

How much money can doors make (or lose) for a plant?



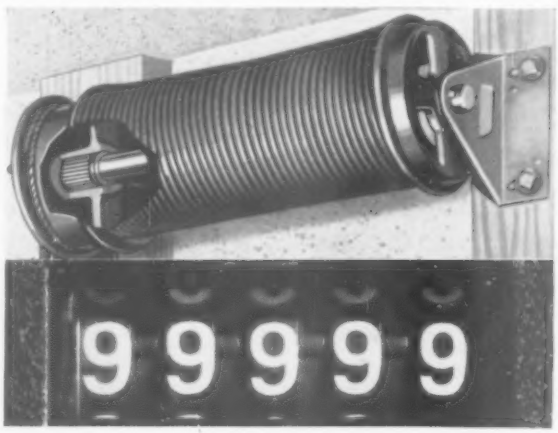
Plant operating COSTS...flow of material, productivity, maintenance, and environmental control...are directly affected by doors. Exclusive Barber-Colman guaranteed 100,000 CYCLE SPRINGS and DOOR INVENTORY PLAN anticipate and prevent expensive trouble . . . before it starts!

For example, when the "most important" (frequently open-closed) doors break down in production-assembly areas . . . the direct or indirect cost of plant operation can skyrocket! Even the failure of a vital shipping-room door can raise havoc with plant efficiency.

CASE PROBLEM: One Midwestern company estimates that it spent over $3000 last year in spring repair and heat loss on six overhead-type doors . . . and this did not include production downtime losses! Door springs fatigue and break . . . the problem was to obtain maximum performance, yet replace springs before breakage occurred!

SOLUTION: The total problem was appraised, using the exclusive Barber-Colman "Cost Analysis of Spring Breakage." As a result, Barber-Colman's big, guaranteed 100,000 CYCLE SPRINGS were substituted and supplied with a reliable mechanical counter to measure operating cycles. Spring fatigue life is now predetermined. In addition to completely reliable, longer door operation . . . future spring replacement is scheduled and expensive downtime and repair are eliminated!

Whether you specify Barber-Colman 100,000 CYCLE SPRINGS for new or existing doors... they will last at least four to five times longer than ordinary equipment. Savings in plant-operating costs can easily be over ten times the initial investment! This is a typical example of how Barber-Colm cost-cutting ideas can work for you!



What is the Barber-Colman DOOR INVENTORY PLAN? How will it help you increase over-all plant-operating efficiency?

The DOOR INVENTORY is a detailed, 41-point check list for investigating basic function and performance of your plant doors. It will help you find sources of existing door inefficiencies, reasons for excessive door repair and maintenance, bottlenecks in material-handling flow, and possible unnecessary loss of productive manpower.

CASE PROBLEM: Another Midwestern plant was spending over $2000 per year for repairs and maintenance of two swinging doors between production areas. Doors were being "bounced" open by fork lift truck operators . . . continuous damage had existed so long that it was an "accepted" cost!

SOLUTION: Applying the DOOR INVENTORY check list, this unnecessary expense was uncovered. As a result, these doors were replaced with up, out-of-the-way OVERdoors plus electric operators with strategically located control stations. Future door damage was totally eliminated . . . with costsavings of nearly $1500 a year!

In addition, the DOOR INVENTORY supplied complete record data on all plant doors . . . furnishing a basis for scheduling a regular preventive maintenance program for further savings!

Effective as a valuable guide in planning new plant facilities . . . the DOOR INVENTORY is another way that Barber-Colman works with you to achieve better performance and less operating cost!

Let your Barber-Colman specialist (see yellow or white pages) tell you the complete story for integrating plant doors to building function . . . help you anticipate . . . plan . . . and prevent unnecessary plant-operating costs.

SEE OUR CATALOG IN SWEET'S OR WRITE FOR COPY

AIA File 16D

THE MARK OF QUALITY

BARBER COLMAN

BARBER-COLMAN COMPANY Dept. AF16, Rockford, Illinois

Otis

WORLD'S WORD FOR ELEVATOR QUALITY

DOLE USES OTIS FREIGHT ELEVATORS in its production line to move canned pineapple to storage after processing. They transport 275-million cans a year. Since 1953, DOLE has protected this vital production capacity with dependable OTIS elevator maintenance. Is elevator maintenance complex? Yes! It is an organization task requiring an unusual combination of skills. Plus a wide knowledge of parts, assemblies, functions, replacement procedures, testing and adjusting. Plus the availability of original replacement parts. Plus immediate service in emergencies.

freight ENGINEERED Otis MAINTENANCE elevators

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

FACTORY

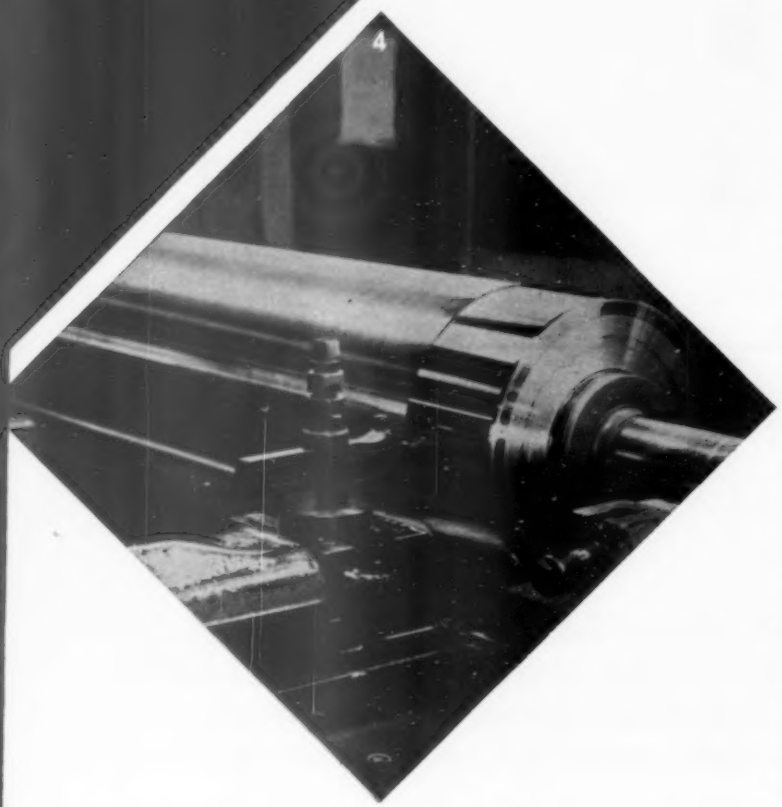
Dole

WORLD'S LARGEST FRUIT CANNERY

275,000,000 CANS OF PINEAPPLE PRODUCTS are grown, processed and packaged each year by DOLE. This fruit, picked from 30,000 nearby acres, amounts to 40% of Hawaii's output. DOLE requires only 15 minutes to process a pineapple once it has entered the cannery. Growing a pineapple is a much slower process! It takes between 18 and 24 months for a new plant to produce a mature fruit. Each year, 100-million slips are planted by hand. One man inserts about 8,000 slips into the ground in an 8-hour day.

Industrial Distributors (Sales), Ltd.

FACTORY



Look at the materials (and costs) that diamonds can cut

Everybody knows that industrial diamonds are used to grind and sharpen carbide tools. But did you know that diamonds can also cut and polish nonferrous metals like aluminum and bronze as well as glass, germanium, ceramics, marble?

Diamonds handle all of these jobs because only diamonds possess a unique *combination* of properties: excellent cutting ability coupled with fantastic endurance. Result: diamond tools last longer than anything else you can use Your people spend more time producing, less time changing tools.

If you cut, sharpen, or smooth in your business, you can probably use diamonds to advantage. Test them against the method you're using. You'll find out how efficient—and economical—a diamond can be, especially now.

Best grit for metal-bond wheels

A new impact crushing method for natural diamonds (developed by the Diamond Research Laboratory in Johannesburg) is producing the strongest and most durable diamond grit ever obtained for metal-bond wheels. Your tool and wheel manufacturer is ready to help you select the diamond tool that's right for *your* job.

1 **Bimetal Bushings** *made at Federal-Mogul-Bower Bearings, Inc., Detroit, have steel shells with inserts of sintered bronze, tin, lead or aluminum. Diamond boring machine produces 15,000 in one shift. Inside diameters are finish-machined to tolerances of ±0.0005 inch.*

2 **Hardened Steel** *is ground with diamond-coated quills for precision grinding of small internal diameters at National Diamond Laboratory, Peekskill, N. Y. Miniature diamond wheels have greater strength and durability than small grinding tools containing conventional abrasives.*

3 **Germanium and Silicon** *are sliced with diamond wheel at Standard Rectifier Corp., Santa Ana, Calif. Cutters are powdered-metal matrix impregnated with small, blocky natural diamonds. No wear has been visible after months of use.*

4 **Copper-Plated Rollers** *of cast iron, steel or aluminum for gravure printing are smooth-finished in a single pass with diamond lathe tool at Southern Gravure Service, Louisville, Ky. Surface finish of about 6 microinches results. No coolant is required.*

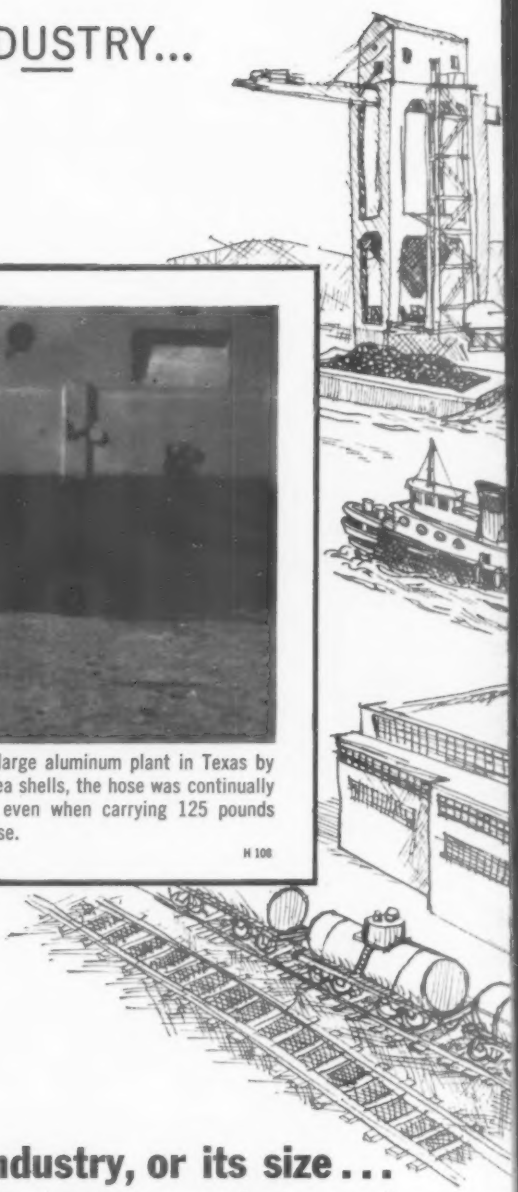
Industrial diamonds cut practically everything... especially your production costs

For more facts Circle 399 on Reader Service Card

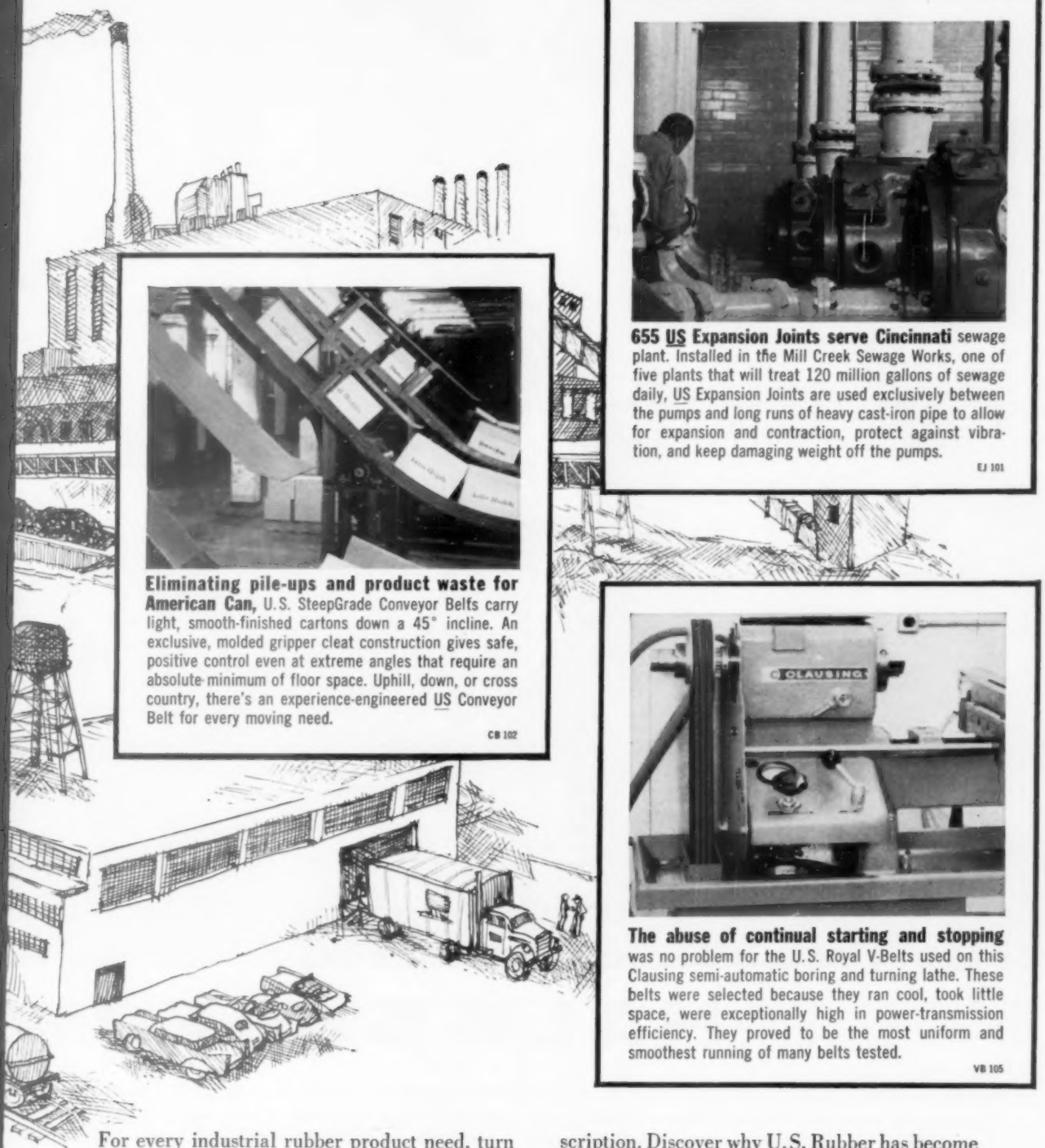
AT THE HEART OF INDUSTRY...

The only hose built like a tire, U. S. Royal Cord Air Hose amazed builders of a large aluminum plant in Texas by its ability to withstand abuse. Lying unprotected on a road surfaced with abrasive sea shells, the hose was continually run over by heavily loaded trucks and even 50-ton cranes — showed no damage even when carrying 125 pounds pressure! Little wonder users have made US the world's largest manufacturer of hose.

H 108



Whatever the time, the place, the industry, or its size . . . odds are you'll find US there. As the world's largest manufacturer of industrial rubber products, U. S. Rubber knows not only the needs of industry, but the answers to those needs. And industry knows US for it.



Eliminating pile-ups and product waste for American Can, U.S. SteepGrade Conveyor Belts carry light, smooth-finished cartons down a 45° incline. An exclusive, molded gripper cleat construction gives safe, positive control even at extreme angles that require an absolute minimum of floor space. Uphill, down, or cross country, there's an experience-engineered US Conveyor Belt for every moving need.

CB 102

655 US Expansion Joints serve Cincinnati sewage plant. Installed in the Mill Creek Sewage Works, one of five plants that will treat 120 million gallons of sewage daily, US Expansion Joints are used exclusively between the pumps and long runs of heavy cast-iron pipe to allow for expansion and contraction, protect against vibration, and keep damaging weight off the pumps.

EJ 101

The abuse of continual starting and stopping was no problem for the U.S. Royal V-Belts used on this Clausing semi-automatic boring and turning lathe. These belts were selected because they ran cool, took little space, were exceptionally high in power-transmission efficiency. They proved to be the most uniform and smoothest running of many belts tested.

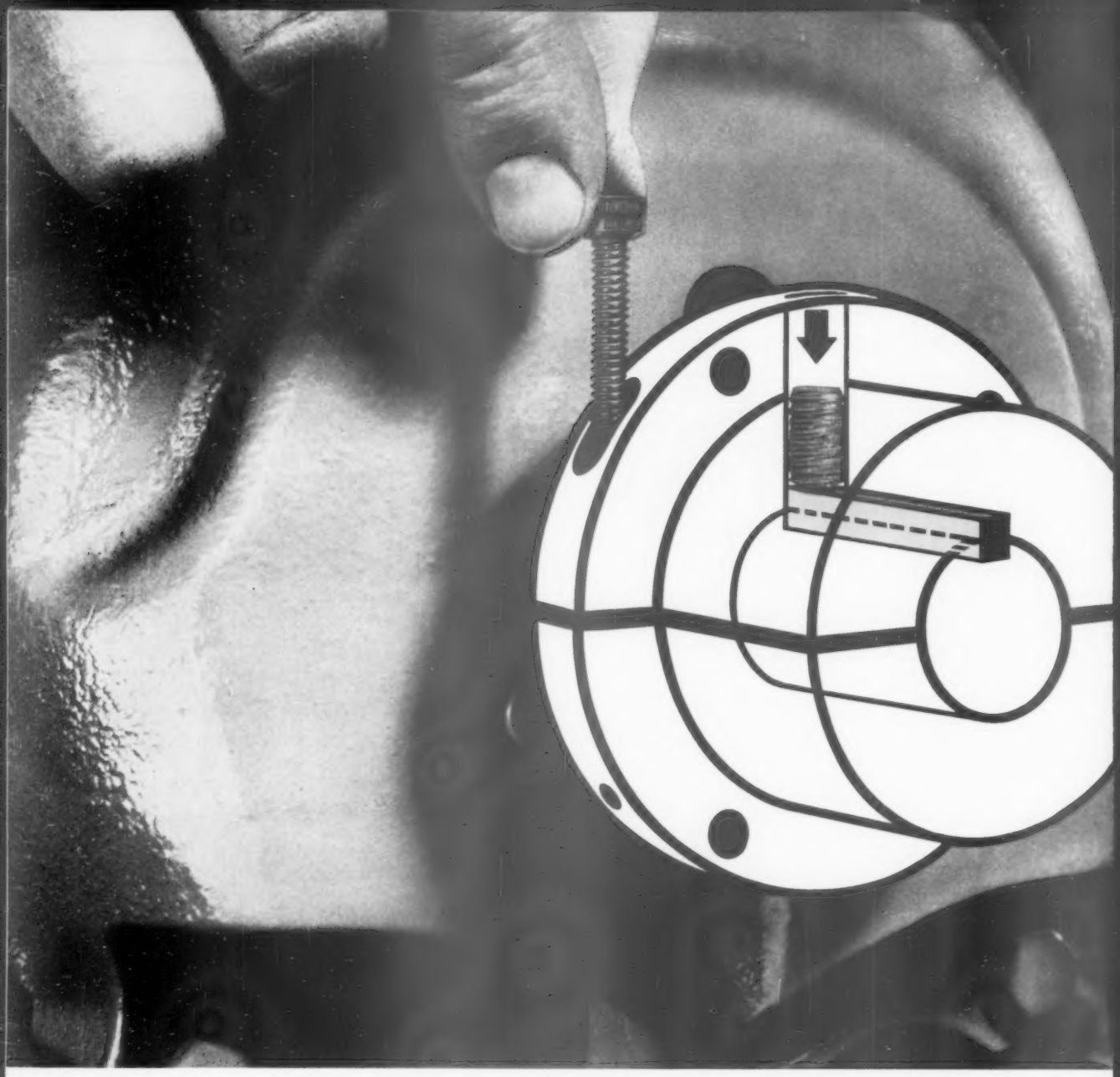
VB 105

For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION



HALF SAFE IS

Have you ever heard of half an accident? Frankly, we don't think so—that's why Worthington gives you double protection by building *Two* Golden Screws into every Worthington hub.

One-half the protection lies in the Golden Screw at the right, above. See how it turns down to lock the key securely in place? This prevents potentially dangerous key drift.

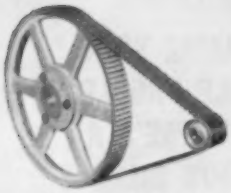
How important is this Golden Screw? Decide its value in light of the maximum possible danger to equipment or personnel from a loose key. And then remember this—you pay no more for this Golden Screw in a Worthington sheave. You get extra value—for the same low price.

The Golden Clamp Screw on the left, above, allows you to locate and lock the hub securely on the shaft. Locking the hub allows you to tighten the set screw without distorting the hub. It is an exclusive Worthington feature. The two piece hub and rim design simplifies installation. You install one piece at a time. You can also make sheave changes without disturbing the hub or affecting the alignment.

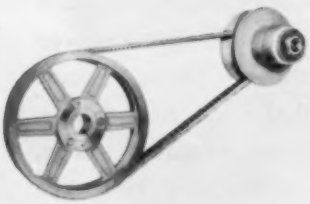
Hubs with Two Golden Screws are supplied with each of the Worthington power transmission products shown at the right. Each product has its own advantages—and all have the extra, full safety feature of the Two Golden Screws at no extra cost.

These products can work for your profit. Learn how they can be designed into your product or how they can add extra protection and performance into your plant. You can do this by asking for one or more of the "how-to-figure-it" design

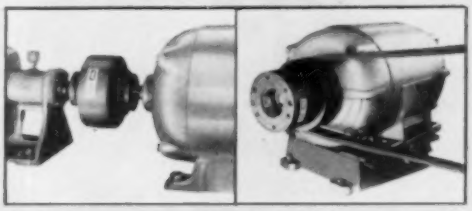
MULTI-V OR MULTI-WEDGE? Multi-V drives have been an industry standard for years. Multi-Wedge drives, using a new, stronger belt design, cut costs sharply. They reduce the number of belts, use smaller, lighter sheaves and reduce center distances.



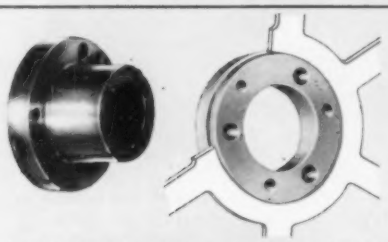
POSITIVE DRIVES. Worthington Positive Drives save weight and space and reduce bearing loads for machines ranging from typewriters to 600-hp giants. It combines the advantages of both chain and belt. There's no stretch, no metal-to-metal contact and no lubrication.



MOTOR PULLEYS AND COMPANION SHEAVES. The new Worthington variable speed Motor Pulley gives speed ratios up to 3:1 in ratings from ⅓ to 15 hp. It has the simplest, most dependable of all motor pulley designs. The companion sheaves feature the Two Golden Screw construction.



CENTRIFUGAL CLUTCHES. These fully automatic clutches protect against overloads and simplify starting problems. Two basic models. A clutch-coupling for direct motor drives and a drive clutch, tapered to receive standard Hy-Torque Multi-Wedge Sheaves, Positive Drive Pulleys or sprockets.



HUBS AND WELD-ON ADAPTERS. Make your product "quick detachable" — easier to mount, always tight on the shaft, easier to remove. Weld the QD Adapter to any shaft mounted part. Then use Worthington QD Hubs with Two Golden Screws. Or machine your part to use the QD Hubs.

NOT SAFE

manuals shown here. Your Worthington distributor stocks these products.

See the Yellow Pages to locate your Worthington Distributor.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

Each Worthington product shown here has the complete safety feature of the Two Golden Screw design. For more information about any of these products, please send this coupon.

WORTHINGTON CORPORATION
Section 79-41, Oil City, Pa.

Please send me your new catalogs on:

- ☐ Multi-V Drives
- ☐ Multi-Wedge Drives
- ☐ Positive Drives
- ☐ Variable Speed Pulleys & Companion Sheaves
- ☐ Centrifugal Clutches
- ☐ QD Adapters

Name_____

Company_____

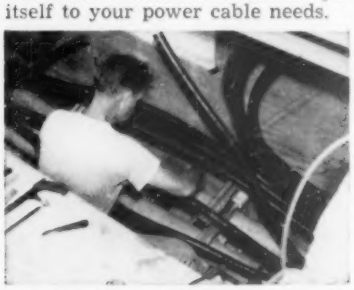
Address_____

City_____ State_____

NAME YOUR CABLE PROBLEM— THERE'S A GOOD CHANCE DURASHEATH CAN SOLVE IT.

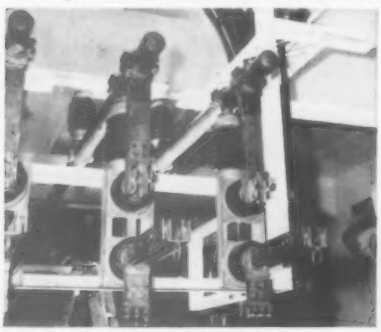
—versatile rubber-insulated neoprene-jacketed power cable that facilitates circuit installation whenever—wherever needed—fast, easily, at low cost. Here are 5 examples.

Riser Cable. In this installation, Durasheath not only serves as an aerial cable, but also as a riser cable running down the side of the building. Without additional terminations, it then drops down-inside to the plants' power-control center. It's another example of the way versatile Anaconda Durasheath adapts itself to your power cable needs.



Installed in ducts. Durasheath's flexibility meant quick and easy installation here. And once installed, its tough neoprene jacket assures long, trouble-free life. Because Durasheath adapts itself to so many uses, your inventory problems are lessened—fewer cables need be carried in stock.

Field or factory-assembled aerial cable. Durasheath may be factory pre-assembled with standard or reverse lay. Or it can be quickly field assembled with the simple spinning operation shown here. Either way, easy splicing, tapping, and terminating result in simplified installation. No cross arms or insulators are needed.



Inside installation. Here's an application where Durasheath was quickly installed and easily terminated. Durasheath's Neoprene jacket resists abrasion, heat and fumes. *Assures dependable performance and long-range economy.*

Direct-burial cable. The moisture-, oil-, and acid-resistance of Durasheath's jacket makes it the ideal cable for direct-in-the-ground applications like the one shown above. Its flexibility cuts installation time and cost because Durasheath is easy to handle. Its durability cuts maintenance costs.

ANACONDA DURASHEATH ALL-PURPOSE POWER CABLE is available in all sizes, single and multiple conductor, copper or aluminum, 600 to 35,000 volts. *Insulations:* Type RHW, Anaconda ANW, AHW, or AB butyl rubber compounds; each designed for specific purposes. *Jacket:* specially compounded neoprene with high resistance to flame, oil, acids, alkalies, sunlight, and ozone. Has high tensile strength and is flexible over a wide range of temperatures.

For complete information about Anaconda Durasheath contact Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York, Department EFL-1-F.

61358-P

ASK THE MAN FROM
ANACONDA
FOR DURASHEATH ALL-PURPOSE POWER CABLE

SAVE TIME SAVE MONEY

HERE'S PROOF

"Almost 100% truck efficiency" . . . "3 now do the work of 5" . . . "2 hours more production per truck per day." These are typical comments from companies where the new Motorola Industrial "Dispatcher" 2-way radio is turning in new records in lift-truck productivity and economy. Careful surveys as well as unsolicited letters keep emphasizing the fact that, in the field of materials handling, the Motorola transistorized Industrial "Dispatcher" is fast becoming a necessity for firms who must stay competitive.

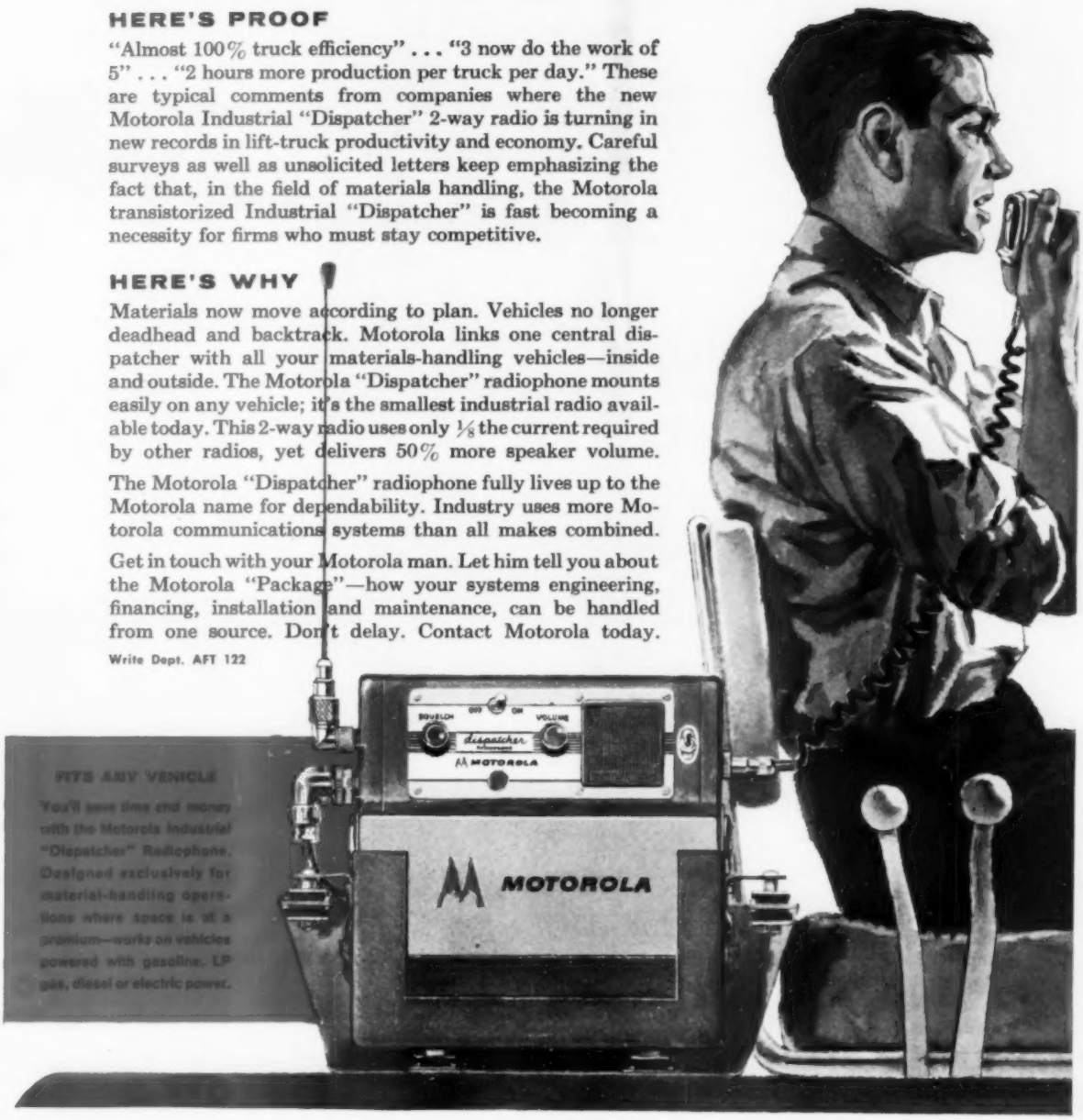
HERE'S WHY

Materials now move according to plan. Vehicles no longer deadhead and backtrack. Motorola links one central dispatcher with all your materials-handling vehicles—inside and outside. The Motorola "Dispatcher" radiophone mounts easily on any vehicle; it's the smallest industrial radio available today. This 2-way radio uses only ⅛ the current required by other radios, yet delivers 50% more speaker volume.

The Motorola "Dispatcher" radiophone fully lives up to the Motorola name for dependability. Industry uses more Motorola communications systems than all makes combined.

Get in touch with your Motorola man. Let him tell you about the Motorola "Package"—how your systems engineering, financing, installation and maintenance, can be handled from one source. Don't delay. Contact Motorola today.

Write Dept. AFT 122



FITS ANY VEHICLE

You'll save time and money with the Motorola Industrial "Dispatcher" Radiophone. Designed exclusively for material-handling operations where space is at a premium—works on vehicles powered with gasoline, LP gas, diesel or electric power.

MOTOROLA INDUSTRIAL TRANSISTORIZED **dispatcher** RADIOPHONE

"Dispatcher" is a trademark of Motorola Inc.

Motorola Communications & Electronics, Inc. • 4501 Augusta Blvd., Chicago 51, Illinois • A Subsidiary of Motorola Inc.

SAVE SPACE, SAVE WEIGHT, SAVE MONEY!

There's a *difference*, as you can see! The 10-groove D-section sheave in the foreground is replaced with the narrow 8-groove 5-V Dyna-V sheave on the line shaft. *Same power*, in a far more compact installation, with a $477 difference in price. And big future savings in belt replacement costs!

Everyone is going Dyna-V! Thousands of installations reveal that Dyna-V performance is *even better* than promised when we first introduced this new compact drive. In medium and high horsepower ranges, savings go as high as 30%!

Dyna-V can handle 3 times as much power in the same space. Dyna-V Sheaves decrease shaft overhang, increase bearing life. And Dyna-V Belts possess *all* premium qualities. Conditions requiring static conductivity or resistance to oil, moisture and heat are met by Dyna-V's one grade—the finest. Ask your Dodge Distributor, or write us for complete drive bulletin. Dyna-V Drives are available for capacities from 1 to 1500 hp.

Dodge Manufacturing Corporation, 400 Union St., Mishawaka, Ind.

The Products with the Pluses...

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Look under "Dodge Transmissioneer" in the *white* pages of your phone book. Factory trained by Dodge, he can give you valuable assistance.

NEW General Electric Industrial Miniature Oil-tight Push Buttons Give You . . .

COLORS UNLIMITED, OVER 40% SPACE SAVINGS

Now you can reduce the size of your control panels at least 40 percent. New General Electric miniature oil-tight push buttons require only about half the panel space of heavy-duty oil-tight units.

Improve machine appearance. Unlimited color combinations are available in operators and rings to complement your equipment—provide positive color identification from any angle. Color is permanent; won't wear off, chip or fade.

Industry's first full line allows you to design entire panels with miniature units. Choose combinations of: standard (with or without guard) and mushroom-head push buttons; wobble stick operator; maintained and spring-return selector switches; coin-operated, cylinder-lock and bat-lever selector switches; resistor and transformer-type illuminated push buttons, indicating lights, and push-to-test lights. G-E miniature push buttons are available in complete units or as separate components, to allow you to make up any form you need with a minimum stock.

Call your General Electric sales engineer or distributor today, or write for publication GEA-7127, General Electric Co., Schenectady 5, N. Y. 811-22

Progress Is Our Most Important Product

GENERAL ELECTRIC

First from General Electric (1959)... another bright idea that became a better lamp for you...Quartzline lamp

packs more light in less space than any other filament lamp

Listen to the nearsighted Mister Magoo . . . "1959? Seems like last week! I volunteered but the authorities picked seven other Astronauts—and General Electric invented the Quartzline lamp. Happy birthday, Quartzline. Tarnation! This confounded pen won't write!"

Understandable mistake, Mister Magoo. The 5-inch, 500-watt Quartzline *is* no bigger than a pen. But it's 19% more efficient than a regular lamp, never grows dim, and gives you better light control than any earlier lamp.

Every Quartzline lamp stays almost 100% bright throughout its life—because General Electric engineering leadership found a way to keep tungsten vapor from blackening the glass. G.E. puts iodine gas in the lamp to catch the particles evaporating from the tungsten filament. Miraculously, the iodine re-deposits them, over and over again, on the steadily-bright filament. This process makes the 5-inch Quartzline last 2000 hours, twice as long as a regular bulb-shaped lamp.

Use Quartzline with the right reflector, and it'll give you a precise, powerful, rectangular beam of light in one direction—as narrow as 6° or as wide as 100°. No elaborate lens system is needed.

Or take the big-brother model, the 10-inch, 1500-watt Quartzline. It's *50% more efficient* throughout its life than a standard 1500-watter of comparable voltage.

Applications? Stadiums. Airport runways. Building facades. Show windows. Inspection or outdoor work areas. Don't worry about rain and snow. Quartzline resists thermal shock.

Ask your G-E distributor for more information on Quartzline lamps—small proof of General Electric lighting leadership! General Electric Co., Large Lamp Dept. C-110, Nela Park, Cleveland 12, Ohio.

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Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 405 on Reader Service Card

Circle 406 on Reader Service Card for items on next page

Six ways your company can cut materials handling costs with NVF Kennett Containers

Today you may be buying materials handling containers made of wood, metal, plastic, cardboard or canvas—at a price that looks like a real saving. But you may be paying *more* in terms of container life and performance. Check these six important cost-cutting features of NVF Kennett Containers made of tough Vulcanized Fibre, and write for complete facts:

Long Life. Kennetts are durable, take the slam-bang of plant operations for years. Replacement cost is nil.

Easier Handling. Kennetts are lightweight. Women handle them easily. Productivity increases.

Less Plant Noise. Kennetts reduce tension-building clatter. Contribute to more efficient plant operation.

Safety. Kennetts are snag-free. Won't chip, peel, splinter, rot or rust. Protect contents, hands, clothing.

Custom Design. Kennetts can be fitted to exact dimensions of your needs. Standard construction in any size or color.

Fire Protection. Kennetts are available in a special fire-resistant grade of fibre: check fire, reduce hazard.

■ Write now for *free*, full-line catalog, or check Sweet's Plant Engineering File 1h/Na for the NVF Sales Office near you. National Vulcanized Fibre Company, Dept. KK, Wilmington 99, Delaware.

NVF

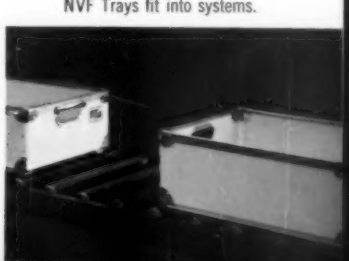
NATIONAL VULCANIZED FIBRE COMPANY
KENNETT DIVISION, Wilmington, Del. • **FISHER DIVISION,** Hartwell, Ga.
In Canada: NATIONAL FIBRE CO. OF CANADA, LTD., Toronto 3, Ontario

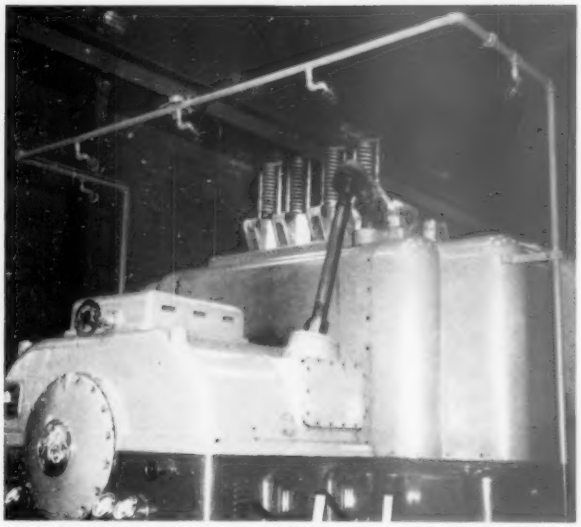
NVF Trays are easily handled.

Reusable Shippers protect instruments.

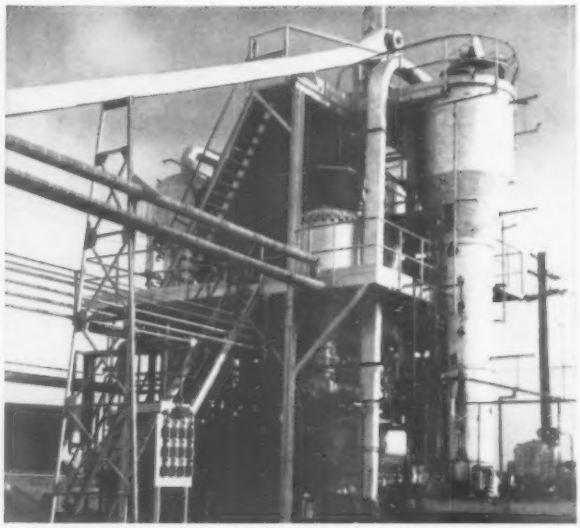
NVF Receptacles are rugged.

NVF Trays fit into systems.





At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.

At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system installed by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.

At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

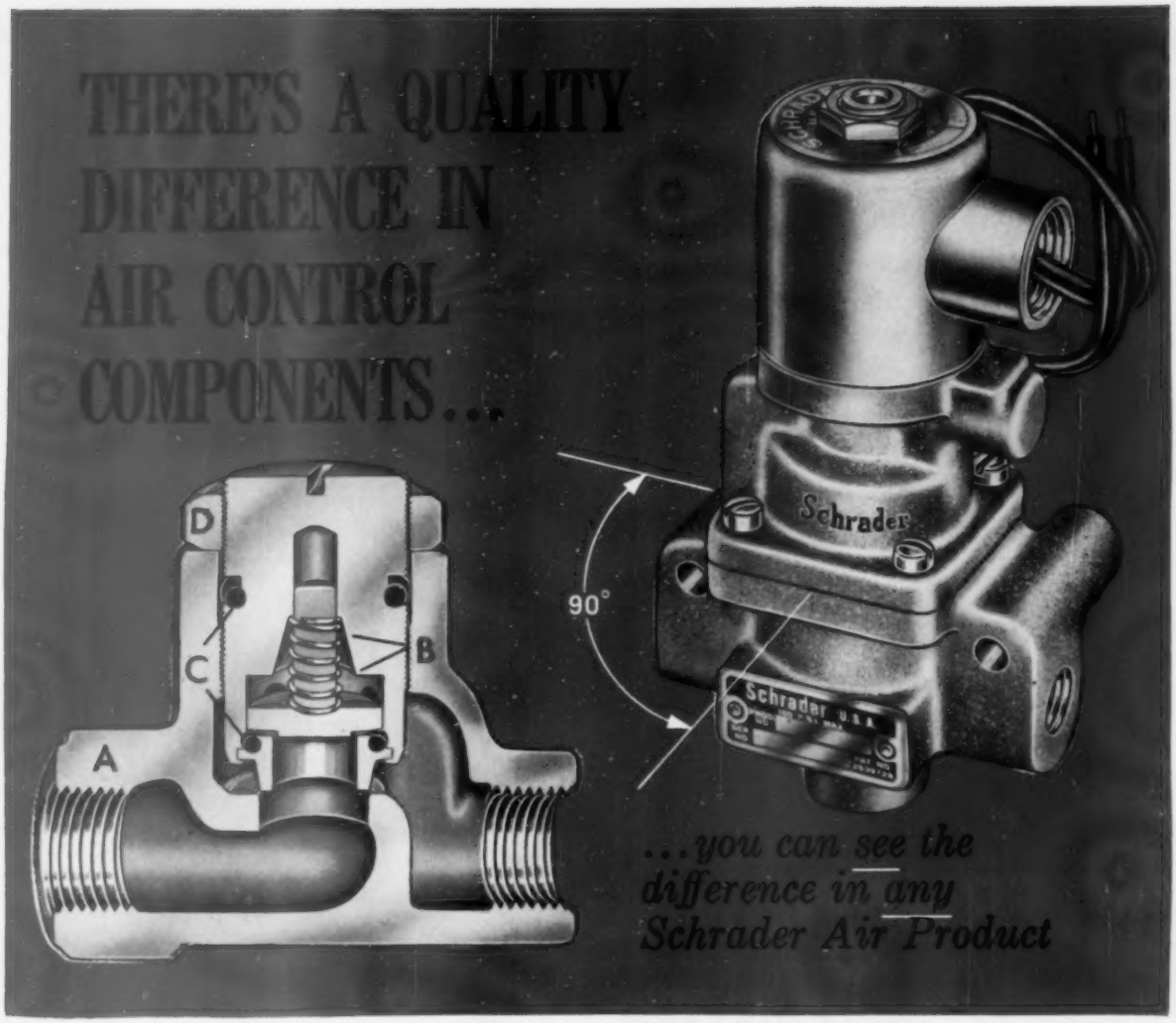
Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870

For more facts circle 407 on Reader Service Card



FOR EXAMPLE: Schrader Flow Control Valves—a unique combination of a poppet by-pass valve and a large "cone seat" metering valve provides full air flow in one direction and carefully controlled flow in the other. (A) Body of cast brass. (B) Compact plunger assembly replaceable in one unit. (C) "O" ring seal for surest airtight performance. (D) Extra-fine screw thread adjustment for vernier-like setting and sturdy lock-nut to hold adjustment even under rough treatment.

ANOTHER EXAMPLE: Solenoid-operated 3-way Valves by Schrader permit electric control of air power and make possible new versatility and compactness in automation and machine design. Typical feature . . . by shifting pilot chamber head 90° a normally-open type may be changed to normally-closed, and vice versa. This poppet type valve, has a self-cleaning seat and provides full air flow assuring optimum characteristics for cyclic operations. Available in five pipe sizes from ¼" to 1".

FULL LINE OF QUALITY AIR CIRCUIT COMPONENTS · OFF-THE-SHELF SERVICE AND INFORMATION FROM YOUR NEARBY DISTRIBUTOR · STAFFED WITH AIR CIRCUIT EXPERTS · CONSULT YELLOW PAGES OR WRITE FOR HIS ADDRESS

Schrader®
a division of SCOVILL

A. SCHRADER'S SON
Division of Scovill Manufacturing Co., Inc.
457 Vanderbilt Ave., Brooklyn 38, N. Y.

QUALITY AIR CONTROL PRODUCTS

For more facts Circle 408 on Reader Service Card

INTERNATIONAL
GRAPHITE
CUTS MATERIALS
HANDLING COSTS
$16,398
WITH MOBIL!

• In addition to direct savings through use of premium oils and greases, there have been immediate and long-term cost reductions through greater engine efficiency and driver training. Gasoline savings have been particularly impressive. Despite increased plant activity, International Graphite has achieved a 30 month total savings in lower gasoline costs of over $5,692.

• For vehicular materials handling units, Mobil made these recommendations: installation of hour meters; proper use of premium lubricants; servicing on a 50-operating-hour basis (about 2 weeks) rather than on a rigid once-a-week schedule. Air cleaners better suited to the conditions of operation were installed. As a result, scheduled servicings have been reduced by an average of 633 annually. In the past 30 months cost of oil, grease and labor have been reduced $8,206.

• International Graphite's Maintenance Superintendent, Mr. Mel Price, center, reports that there have been substantial savings, too, in the area of motor overhaul. Prior to changes recommended by Mobil in 1958, complete motor overhauls averaged 9 a year on 25 vehicles. During the last 30 months, this has been reduced to an average of 7 a year. Resultant savings in reduced labor and parts costs have amounted to $2,500.

• For over 20 years, Mobil has helped reduce costs for the International Graphite and Electrode Division of Speer Carbon Company, Niagara Falls, New York, a major producer of such finished graphite products as anodes, electrodes, and molds, as well as specialties for the railroad, chemical and munitions industries.

International Graphite faces exceptionally severe maintenance problems because of highly unusual conditions at the plant. Abrasive particles of carbon, sharp sand and silicon-carbide find their way into all types of materials handling equipment, necessitating a heavy schedule of preventive maintenance. By recommending superior lubricants and improved PM techniques, Mobil Engineers have helped International Graphite effect an additional $16,398 reduction in costs of maintaining and operating this equipment during the past 30 months.

Consistently over the years, Mobil has *proved* its value to industry. To learn how Mobil may help you, call your nearest Mobil Representative. Or write, Mobil Oil Company, 150 East 42nd St., New York 17, N. Y.

Mobil

For more facts Circle 409 on Reader Service Card

ONLY VISIBLE BLADES GIVE YOU SAFETY YOU CAN SEE!

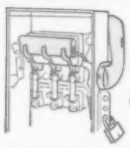
Square D Company,
Mercer Road, Lexington, Kentucky

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on **V**isible **B**lade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more... why settle for less?

Extra Safety with Square D's Handle Design



WHEN IT'S **UP** IT'S **ON!**

WHEN IT'S **DOWN** IT'S **OFF!**

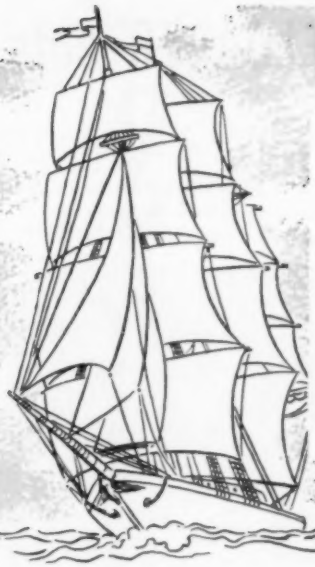
Handle is integral part of switch, not cover. When door is opened, handle remains attached to switch. Eliminates hazard of false handle indication or defeat of padlock provision. When it's padlocked, it's locked!

SQUARE D COMPANY

wherever electricity is distributed and controlled

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

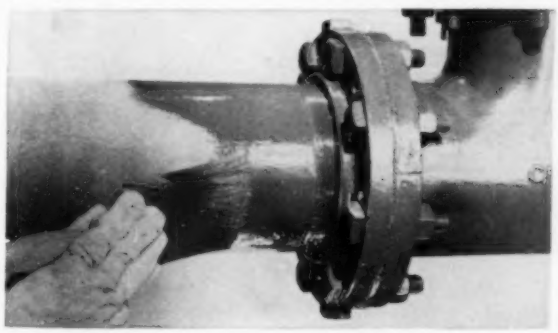
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2483 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

For more facts Circle 411 on Reader Service Card

BAKER TRAVELOADER® cuts warehouse operating costs

The custom-made doors produced by Richards-Wilcox Manufacturing Company require materials in awkard lengths and sizes. The side-loading Baker Traveloader easily handles long, bulky selective loads...maneuvers in aisles only 6½′ wide. Note how it stacks right up to the 14′ ceiling. Model shown is TPD-040, electric-powered. Also available in gas Ready-Power.

y over $10,000

Richards-Wilcox Manufacturing Company, Aurora, Illinois, manufacturers of overhead chain conveyors, industrial doors and door operators, moveable walls . . . REPORTS . . .

"We need to operate our Baker electric Traveloader only about 700 hours a year—less than 3 hours a day. Yet, it does the work of 2 full-time men. What we save on labor costs alone will pay for our Traveloader in less than 2 years. We figure it saves us at least $10,000 a year."

The exclusive side-loading feature of the Baker Traveloader enables Richards-Wilcox to pick up long, bulky loads at the railroad spur and move them quickly and efficiently into their warehouse. One unit loads, stacks, transports . . . requiring only one man, instead of a crew. The versatile Traveloader moves both 12′ to 30′ lengths of lumber and 4′ x 8′ plywood panels. Loads average from 3,000 to 4,000 lbs.

Working on an average of only 2¼ hours a day, the Traveloader saves Richards-Wilcox 3,300 man-hours annually—the equivalent of two full-time men.

Operates in 6½′ aisles

Because it operates in an aisle only 6½′ wide . . . stacks up to 14 feet . . . the Traveloader enables Richards-Wilcox to make maximum use of their warehouse space.

In fact, they can handle 500,000 board feet of lumber and 225,000 board feet of plywood and hardboard in only 13,000 square feet of space.

Only 5 lubrication points

Maintenance on the Traveloader is nominal. Five lubrication points are periodically checked. A twice-weekly, overnight battery charge keeps the truck operating at peak efficiency.

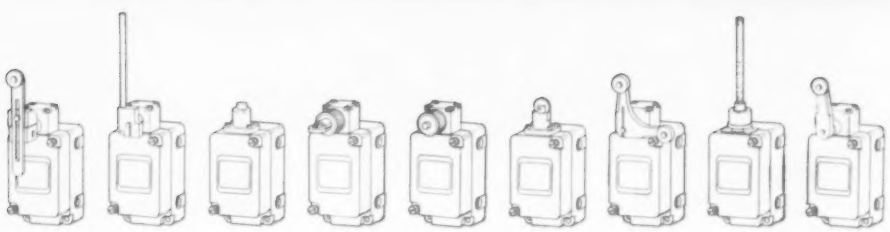
Richards-Wilcox find their Traveloader both cleaner and much more economical to operate than their smaller-capacity, gasoline-powered trucks. Put into operation in February 1960, a single Traveloader saved this company over $10,000 the first year.

Your BAKER BRANCH or FRANCHISED DEALER is listed in the YELLOW PAGES under "TRUCKS—INDUSTRIAL"

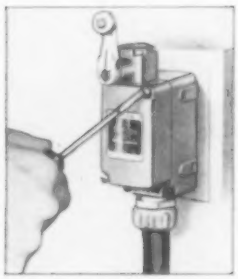
BAKER INDUSTRIAL TRUCKS
Division-Otis Elevator Company
SALES-SERVICE-PARTS—Fork Lift Trucks—Solid and pneumatic tires. Gas & electric. Side-Loading TRAVELOADER platform trucks & cranes. RENTALS-LEASES-USED TRUCKS
"FOR INFORMATION CALL"
DISTRIBUTOR NAME
Address.....Telephone No.....

A DIVISION OF OTIS ELEVATOR COMPANY
BAKER
BAKER INDUSTRIAL TRUCKS • CLEVELAND 2, OHIO

"Plug-in Limit" switches save

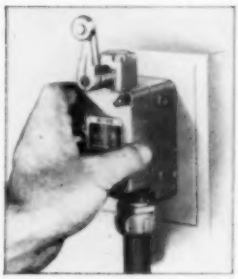


costly downtime
with fast, 20-second replacement

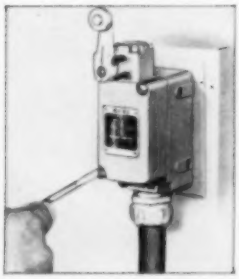


LOOSEN TWO SCREWS

PULL OUT SWITCH



PLUG IN REPLACEMENT



TIGHTEN SCREWS

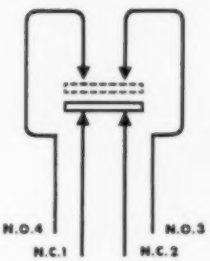
MICRO SWITCH oiltight "Plug-in Limit" switches save hundreds of dollars in replacement time with their easy 20-second replacement. Four sturdy spring plugs fit receptacles in the terminal block quickly and securely!

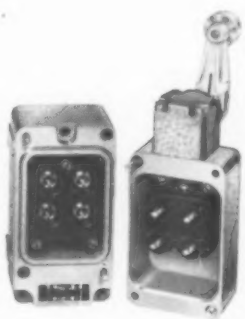
The "Plug-in Limit" switch line is built to handle the toughest of jobs. It has oiltight seals, rugged actuators and long-life snap-action switching elements.

Actuator heads are adjustable to different positions. Mounting blocks may be mounted from side or back. Nine standard and many special actuator designs are available.

Contact arrangement of the "Plug-in Limit" switch shown is single-pole double-throw double-break as in the diagram at right.

See the Yellow Pages for the MICRO SWITCH distributor or write for Catalog 84.





Notice the sturdy easy-to-match plugs and receptacles. Wiring is easy and fast. Ample wiring space. No. 8 terminal screws. Terminal block, shown at left, having no moving parts, is permanently installed on machine.

MICRO SWITCH . . . FREEPORT, ILLINOIS . . . A division of Honeywell

In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

Honeywell

MICRO SWITCH Precision Switches

HONEYWELL INTERNATIONAL

Sales and service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

For more facts Circle 413 on Reader Service Card

SILICONE NEWS from Dow Corning

Now...Time for the Boys

Electrical Problems No Longer Short Circuit Our Family Fun

Sure, a father should be a pal to his sons . . . and, mine are at the age when they need and appreciate my companionship most. But when you're lucky enough to be employed at an assembly plant that's doubled capacity twice in the past eight years, you've got more than a full time job . . . and family activities frequently have to take a back seat.

During these eight years I've come up through maintenance to Assistant Plant Manager. It started when I suggested we replace certain troublesome motors with silicone insulated units. Then, when we doubled our plant the first time, I suggested we could double our electrical load capacity in the same floor space by using silicone insulated transformers. Just before our last expansion, my boss was made Plant Manager and I moved up to his assistant. He's taught me a lot . . . and I think I've helped him. We're a good team. And, for the first time since I started working, I'm finding time to really enjoy my boys. By the way, the car we're restoring is a Model A. No, not a Ford . . . a Dusenberg.

I think my progress is the result of plenty of hard work and a good eye for new and better ways of doing things. One of the most important things I've ever read was an advertisement on Dow Corning silicone insulation for electrical transformers and motors—just as you're doing now. I wrote for more information. Why don't you?

For brochure, "Specify Silicone Insulation and Save", Write Dept. 4418.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 414 on Reader Service Card

4 critical factors in insect control... how many have you solved?

Internal insect control methods are as strong as the proverbial weakest link.

Read how a laboratory-trained representative can help increase your results with a West "4 Point" Program, tailored to strengthen each and every key factor.

#1 *Diagnosing the problem*

The West representative starts with identification. Not only the most common species – but *all*. He knows not only *what* to look for, but *where*. And *when*.

He draws from West's 74 years of success in insect control – in virtually every industry – from coast to coast. From one of the world's most authoritative entomological laboratories. And from his personal experience in your own area.

#2 *The right product, an individual requirement*

This is a good deal more exacting than matching species and a potent killer.

In certain industries, risk of contamination is a problem. Or staining. Or work slowdown. These are considered in the program – and resolved.

Many West clients enjoy substantial savings with dramatic reductions in spoilage.

Others save by using less potent – and less expensive – insecticides, proved ample for their specific needs.

Still others, with specially formulated West products, achieve results where previous insecticides had failed.

#3 *The right method for most efficient results*

Increasing results without increasing costs is often achieved with a more efficient method of application.

One ingenious West installation dry fogs a 100,000 cu. ft. plant in less than 10 minutes. A special atomizer fumigates a railroad box car in less than 2 minutes.

An economical hand model automatically meters out protection for schools, institutions and offices.

With many different *types* of apparatus, individually or in combination, a West representative can prescribe a system that increases both results and efficiency.

#4 *Training personnel*

No matter how thoroughly points 1-3 are covered, results – and savings – depend upon *proper* application.

And here's the valuable extra. The West specialist works with your personnel – provides free instruction – free periodic supervision – free follow up. Time, temperature and coverage requirements are part of the program and part of the training.

For more information on West's "4 Point" Program and how it can be tailored to answer your needs, the man to contact is your West representative. No obligation of course. Simply complete and mail coupon below. West Chemical Products, Inc., 42-16 West Street, Long Island City 1, N. Y.

WEST CHEMICAL PRODUCTS INC.
WEST DISINFECTING DIVISION

SPECIAL FREE OFFER!

West Chemical Products, Inc., Dept. L
42-16 West Street, Long Island City 1, N. Y.

Gentlemen: Please send me a personal supply of a new insect repellent that you wipe on with a disposable towel

Name_____

Title_____

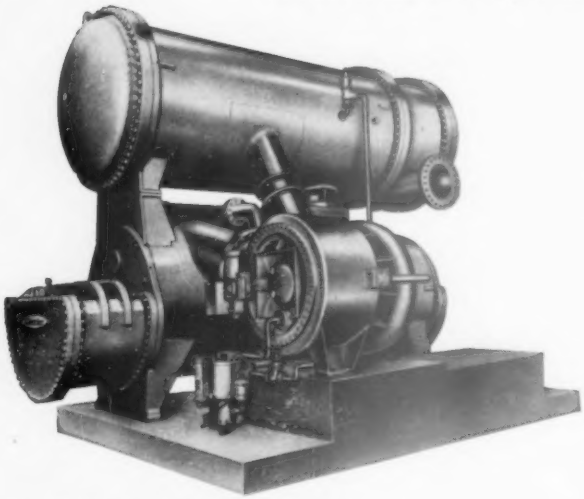
Company_____

Address_____

City_____ Zone____ State_____

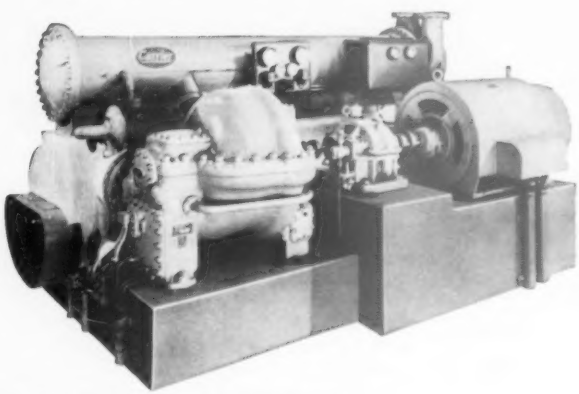
CARRIER CENTRIFUGAL REFRIGERATION CAN BE USED WITH ANY TYPE OF DRIVE

... electric motor, steam or gas turbine, diesel or gas engine!



Carrier Centrifugal—2000 to 5000 tons

With barrel type compressor—can be used with electric motor, steam or gas turbine, diesel or gas engine drives.



Carrier Centrifugal—100 to 2000 tons

With horizontal split casing—can be used with electric motor, steam or gas turbine, diesel or gas engine drives.

The versatility of Carrier Centrifugal Refrigeration Machines is practically unlimited for air conditioning, process cooling or low-temperature refrigeration down to minus 185 F.

They are available in the industry's widest range of capacities—from 100 to 5000 tons.

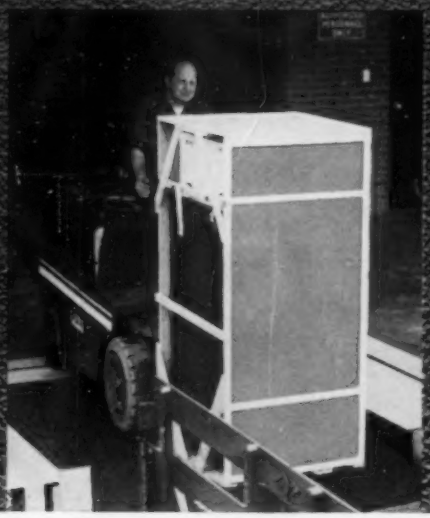
They can be powered with any make or type of electric motor—variable or constant speed, a.c. or d.c., high or low voltage—or with a high or low pressure steam turbine, gas turbine, diesel or gas engine.

Though "custom-built," they also offer the economy of standard units. Carrier manufactures standard compressors, condensers and coolers in a number of sizes. That makes it economical to combine standard components matched to your needs.

Since the first Carrier machine, installed in 1922, more than 5000 Centrifugals all over the world have proven the day-in and day-out dependability of Carrier refrigeration. You can specify and use Carrier equipment with confidence on any project. Just write Carrier Air Conditioning Company, Syracuse 1, New York. In Canada: Carrier Air Conditioning Ltd., Toronto 14.

Carrier Air Conditioning Company

Wheel slippage problem solved at Consumers Power Company's Bay City, Michigan, Service Center *because* M-S-A Dura-Grip stays down, stays safe



Before Consumers Power applied Dura-Grip to their loading ramps early in 1960, slippage was a real problem. Outdoor moisture and oil drippings from fork lift trucks caused a hazardous surface for all kinds of traffic.

But a yellow coating of Dura-Grip on the ramps solved the problem. Now ramp traffic —both personnel and vehicles—moves without menace. No more traction difficulties. No more footing problems.

Yellow was used here to harmonize with the building's safety color scheme. But you may also choose from red, black or gray.

M-S-A Dura-Grip is composed of a tenacious polyurethane bonding resin impregnated with abrasive aluminum oxide grits. It will *not* come up. *This* is the material that stays down. A low first cost step to preventive maintenance. Goes on easily. Lasts for years.

Consider Dura-Grip for plant stairs or entrance ways. For catwalks or shower rooms. Transportation equipment or loading platforms. Anywhere men or machines can slip, slide, spin or skid.

Like to learn more about Dura-Grip? Ask the MSA representative. Or write for product data bulletin to Mine Safety Appliances Company, Pittsburgh 8, Pennsylvania.

FREE SAMPLE OF APPLIED MATERIAL ON REQUEST!

MSA backs up its label with selection, quality, research, experience

MINE SAFETY APPLIANCES COMPANY

MSA

LINK-BELT Fan-cooled Worm Gear Speed Reducers

right speed... at right angles

SINGLE, DOUBLE AND HELICAL WORM GEAR COMBINATIONS!

There's a Link-Belt worm gear speed reducer for *every* right-angle need. Link-Belt offers industry's *most complete* range of types and sizes . . . in single and double reductions . . . horizontal and vertical mountings . . . with many combinations of input and output shaft arrangements.

These shock-absorbing reducers operate smoothly and quietly. Durable and compact, they are unsurpassed for adapting high motor speeds to modern production needs. Power is transmitted at either moderate or slow output speeds with ample capacity for heavy loads.

All types are fan-cooled. An aluminum radial fan directs a steady flow of air over the finned sides of the housing, resulting in cooler operation that pays off in increased hp for each center distance . . . lower initial cost.

Other design features include: automatic splash lubrication, durable centrifugally cast bronze-alloy gears, hardened, ground and polished nickel-steel worms and adequate roller bearings. Single and double lip oil seals ride on micro-finished shafts. High capacity involute helicoid worm threads assure accurate engagement.

LINK-BELT

ASK OUR ENGINEERS!

Our experienced field engineers will help you with your application problems. With industry's most complete speed reducer line to work with, their recommendations are unrestricted, unbiased. Contact your nearest Link-Belt office or authorized distributor. Ask for book 2824.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,501

For more facts Circle 418 on Reader Service Card

MARMAN FLEXMASTER Pipe Joints Cut Replumbing Time 75%

Why use expensive threaders, cutters and heavy wrenches?

Breakdown and replumbing of a vital process water system threatened 75% of a west coast manufacturer's production. The plant engineer cut the time necessary for the job to 25% of that required by ordinary plumbing methods by using Marman FLEXMASTERS.

These versatile units joined pipe without flanging, threading or grooving in the restricted pump pit shown at right and one man did the job with an ordinary hand wrench. Because they allow 4° angular misalignment and accommodate axial pipe movement or length variation, proposed excavation of underground piping was avoided and plant downtime prevented through use of FLEXMASTERS.

Marman FLEXMASTERS are available in sizes from ⅜" to 4" O.D., with lengths to 36", including elbows, tees and crosses. Good for 150 lb. service with a 4:1 safety factor. Temperature range from −40 to +250° F.

Learn how the plant engineer saved his company thousands of dollars on just this one job. Send for FLEXMASTER Bulletin No. 805 and list of distributor locations with details explaining emergency problems encountered in modification of this pumping system. Just return coupon.

FLEXMASTER is an Aeroquip trademark.

Aeroquip

MARMAN DIVISION

11214 Exposition Blvd., Los Angeles, California

Aeroquip (Canada) Ltd., Toronto 19, Ontario

Marman Products are Covered by U.S. and Foreign Patents and other Patents Pending

MARMAN DIVISION, AEROQUIP CORPORATION
11214 Exposition Blvd., Los Angeles, California

Please send FLEXMASTER story.

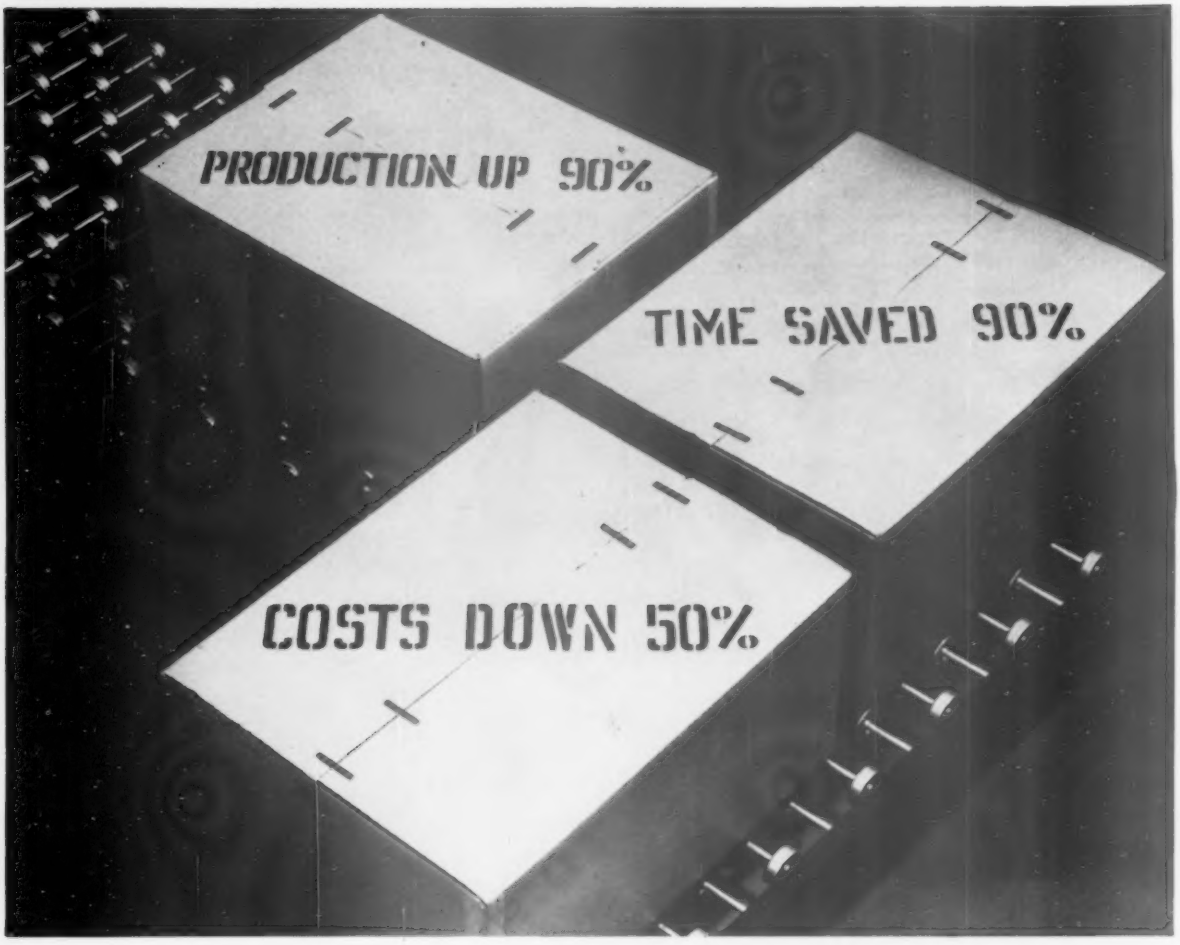
Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____



...AFTER PABCO CHANGED TO BOSTITCH IN THE SHIPPING ROOM

Pabco Floor Covering, at Emeryville, California, found savings like this in its shipping room through the use of Bostitch stapling methods. For instance, linoleum rugs were formerly shipped in tubes closed by burlap and tape. A switch to a Bostitch machine enabled the end-protecting discs to be stapled on the tubes. This move alone increased production over 90% while cutting costs in half. Similar efficiencies were gained throughout the shipping room with Bostitch stapling equipment.

Your Bostitch Economy Man—one of 350 in 123 U. S. and Canadian cities—may be able to point out similar opportunities for savings in your own shipping department with your own personnel. He's listed under "Bostitch" in your phone book. Call him soon. No obligation, of course.

Tacking of end-protecting discs on floor covering tubes. Machine fastens caps to tubes with eight staples, driven in two operations, four staples at a time to raise efficiency.

Box bottoming with a Bostitch stitcher speeds carton forming in Pabco's shipping department. Bostitch furnishes stapling machines for every shipping room need.

This Bostitch bottom stapler cuts stapling time in half in bottoming shipping containers. This typifies some of the savings that can be made with Bostitch stapling equipment.

Fasten it better and faster with

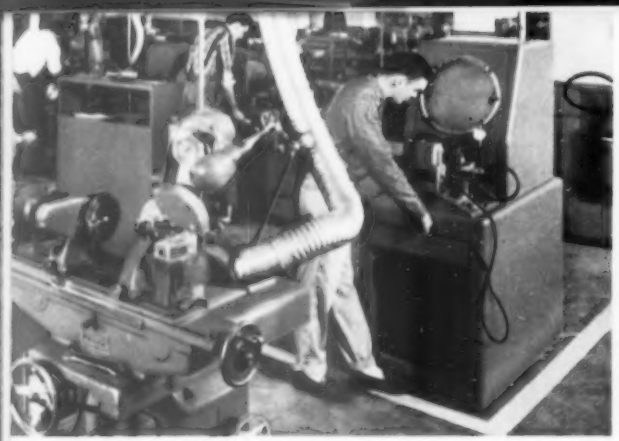
BOSTITCH®

STAPLERS AND STAPLES

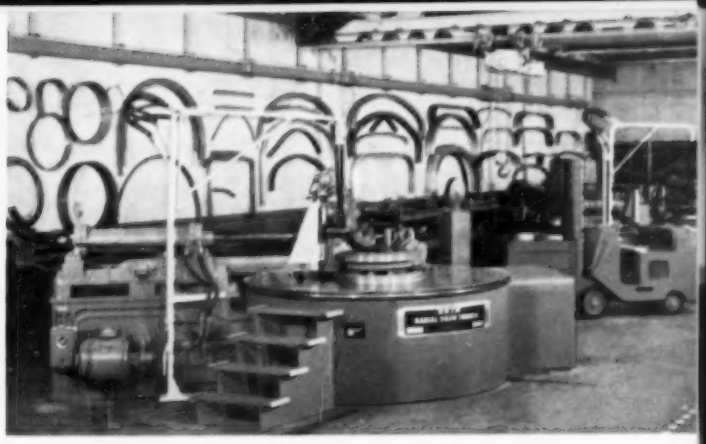
606 Briggs Drive, East Greenwich, Rhode Island

For more facts Circle 420 on Reader Service Card

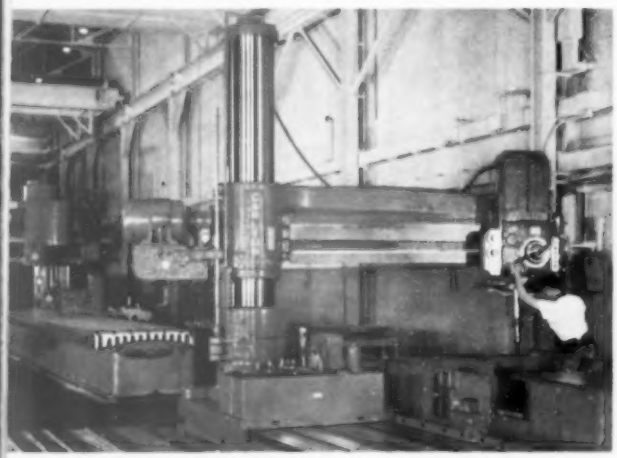
Circle 421 on Reader Service Card for items on next page



"Pittsburgh's scientific painting system of COLOR DYNAMICS *has helped to improve the quality of our craftsmanship." Ben John Goodman, Morgood Tools, Inc., Rochester, N. Y.*



"The clean, well-ordered look COLOR DYNAMICS *has given our plant is visual evidence of our skilled workmanship." F. J. Phillips, sales manager, The Cyril Bath Company, Solon, Ohio.*



*"*COLOR DYNAMICS *helps us maintain the productive efficiency of our work force at higher levels for longer periods." W. R. Gerchow, vice-president, Buhr Machine Tool Company, Ann Arbor, Mich.*

*"*COLOR DYNAMICS *has given us for many years a desirable bonus in efficiency, morale and safety without extra cost." Clarence Davis, president, Davis Tool & Engineering Company, Detroit, Mich.*

Leading makers of specialized tools agree: Pittsburgh COLOR DYNAMICS® increases productive efficiency

- Lessens eyestrain, physical fatigue
- Improves morale of workers
- Reduces hazards of time-loss accidents
- Costs no more than ordinary painting

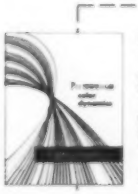
• **Executives of many companies** which build specialized tools for industry agree that Pittsburgh COLOR DYNAMICS steps up efficiency, morale, and safety in their plants.

• **This modern system of painting** makes scientific use of the influence of color upon people. Light colors of high reflectance, used on upper walls and ceilings, make work areas more pleasant and cheerful.

• **Focal and eye-rest colors** on machinery and lower walls help operators see their work better. Eye fatigue and nervous tension are lessened, absenteeism reduced. Warning and safety colors on controls, material-handling equipment and traffic lanes reduce danger of time-loss accidents.

• **And these important benefits** are gained at no greater cost than ordinary maintenance painting. Why not let us show you how COLOR DYNAMICS can produce results like these in your plant?

• Send coupon for free copy of booklet which explains what COLOR DYNAMICS is and how it can be applied. If you wish, we'll also gladly prepare a detailed color plan of your factory without cost or obligation.



Pittsburgh Plate Glass Co., Paint Div., Department F-61, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet "COLOR DYNAMICS."

☐ Please have your representative call for a COLOR DYNAMICS survey without obligation on our part.

Name_____

Street_____

City_____ County_____ State_____

PG® **PITTSBURGH® PAINTS**

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

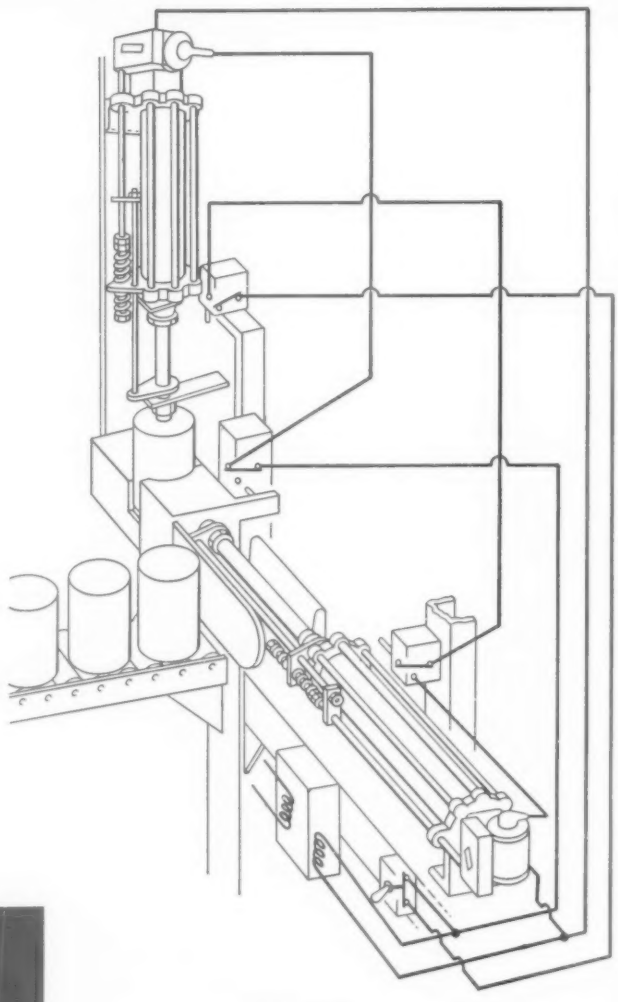
IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

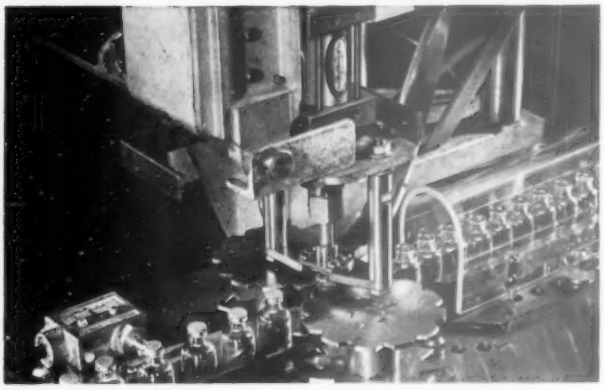
YOU CAN BUILD THIS SIMPLE MACHINE TO LABEL, STAMP, CAP OR SEAL

This SPOT-A-MATION IDEA is another example of how much more simply and economically an operation can be automated using Bellows "Controlled-Air-Power" Devices. The ease of construction and low cost also suggest why these versatile work units have stimulated the imagination and creative ingenuity of cost-conscious men in all types of industries.

Originally designed to punch holes in the bottoms of clay flower pots, this shop-built machine is adaptable to many other operations, such as inserting lids in cans, applying labels, stamping numbers, etc. The two Bellows Air Motors are interlocked to work alternately. A gravity conveyor delivers a clay pot to the first Air Motor, which moves it to a position under the second Air Motor. After the piston rod of the second Air Motor has moved through the work stroke and returned to "up" position, the cycle automatically repeats. This is practical, low-cost automation.

Now, stop a moment and ask yourself a question: "How can I use Bellows "Controlled-Air-Power" to produce more at less cost in *my* plant?"





An adaptation of this SPOT-A-MATION IDEA permitted a drug firm to plug bottles—automatically—four times faster than had been done by two operators. Because sterility was vital, automating the operation with Bellows equipment eliminated the possibility of contamination by human hands.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains installation data, wiring diagrams and equipment lists for scores of Bellows "Controlled-Air-Power" applications, enabling you to automate existing machines or build your own low-cost special-purpose equipment. Write for yours today. No obligation. Address Dept. FA-661, Bellows-Valvair, Akron 9, Ohio.

13438-3

Bellows-Valvair

AKRON 9, OHIO

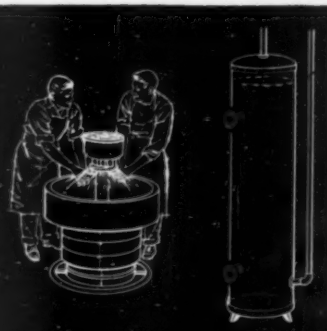
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

CHROMALOX ELECTRIC WATER HEATING UNITS

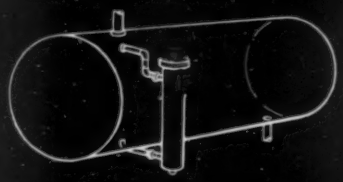
For hot water *anywhere* . . .

as much as you need . . . when you need it

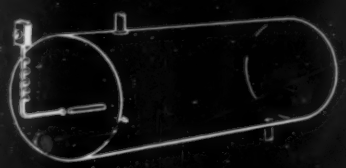
Screw-in, flanged or side-arm water heaters of any capacity for the entire range of in-plant hot water needs are quickly, easily, economically installed where needed. No flues necessary.



For washroom and shower hot water—Chromalox Electric Heaters are easy to install, safe and economical.



Highly efficient Chromalox Electric Circulation Heaters automatically provide large quantities of water at controlled temperatures varying plant needs.



Chromalox Electric Immersion Heaters mounted on each end of hot water storage tank for an efficient shower.

At Your Service . . .

CHROMALOX "Answer Men"

ALBANY, N. Y.	HObart 3-0626
ATLANTA, GA.	TRinity 5-7244
BALTIMORE, MD.	Hopkins 7-3280
BLOOMFIELD, N. J.	EDison 8-6900
BOSTON, MASS.	CEdar 5-8040
BUFFALO, N. Y.	Phone TT6-4000
CHARLOTTE, N. C.	FRanklin 5-1044
CHATTANOOGA, TENN.	AMherst 5-3862
CHICAGO, ILL.	Harrison 7-5464
CINCINNATI, OHIO	Trinity 1-0605
CLEARWATER, FLA.	Phone 446-7706
CLEVELAND, OHIO	Prospect 1-7112
COLUMBUS, OHIO	AMherst 7-8260
DALLAS, TEXAS	Riverside 8-9004
DAVENPORT, IOWA	Phone 326-5233
DENVER, COLORADO	GLendale 5-3651
DES MOINES, IOWA	CHerry 3-1203
DETROIT, MICH.	KEnwood 8-2100 ELgin 7-0677
HOUSTON, TEXAS	CApitol 5-0356
INDIANAPOLIS, IND.	Melrose 5-5313
KANSAS CITY, MISSOURI	VIctor 2-3306
LOS ANGELES, CAL.	LUdlow 9-6321
MIDDLETOWN, CONN.	DIamond 6-9606
MILWAUKEE, WIS.	Broadway 1-3021
MINNEAPOLIS, MINN.	Federal 6-6631
NASHVILLE, TENN.	CYpress 2-7016
NEW YORK CITY, N. Y.	WOrth 4-2990
OMAHA, NEBRASKA	341-7600, 7610
PHILADELPHIA, PA.	GReenwood 3-4477
PITTSBURGH, PA.	EMerson 1-2900
PORTLAND, OREGON	Capitol 3-4197
RICHMOND, VIRGINIA	ATlantic 8-8758
ROCHESTER, N. Y.	HAmilton 6-2070
ST. LOUIS, MISSOURI	Chestnut 1-2433
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Your sure answer to plenty of hot water at any time — winter or summer — is Chromalox Electric Heating Units. Chromalox can give you a steady, dependable supply of hot water anywhere in your plant . . . even when comfort heating boilers are down! Chromalox Electric Heaters, with separate or built-in controls, can be quickly installed in large or small storage tanks. You can select the type of units best suited and most economical for your needs — screw-in or flanged immersion heaters and side-arm circulation heaters — and put them to work where you need hot water. Most models available immediately. No fumes — no flues — no pilot flame — no fuel shortage worries. Install and forget — for years of maintenance-free service.

FOR YOUR INFORMATION
Send for Water Heating Bulletin PD-105, Industrial Process Catalog 60, Comfort Heating Catalog F-975D

WI-6

EDWIN L. WIEGAND COMPANY
7518 THOMAS BLVD., PITTSBURGH 8, PA.

CHROMALOX
ELECTRIC HEAT

PROCESS COMFORT

For more facts Circle 423 on Reader Service Card

"I like a man my people listen to"

"Herb Peterson is no outsider to our people," says E. B. Danzell, President of the famed Wallace Silversmiths. "His persistence and patience in advising us on accident control has helped us reduce our accident frequency from 9.18 to 1.15 over the past 4 years."

Herb Peterson is the manager of our engineering service in the Hartford area. Safety Engineers like him are on every American Mutual local team to help policyholders get better protection at lower cost. There's a fully staffed American Mutual office near you. You'll find it listed in the Yellow Pages.

American Mutual

LIABILITY INSURANCE COMPANY

©1961, American Mutual Liability Insurance Company, Wakefield, Massachusetts

Emery B. Danzell, left and Herb Peterson watch a finishing operation in Wallace's huge Wallingford, Connecticut plant.

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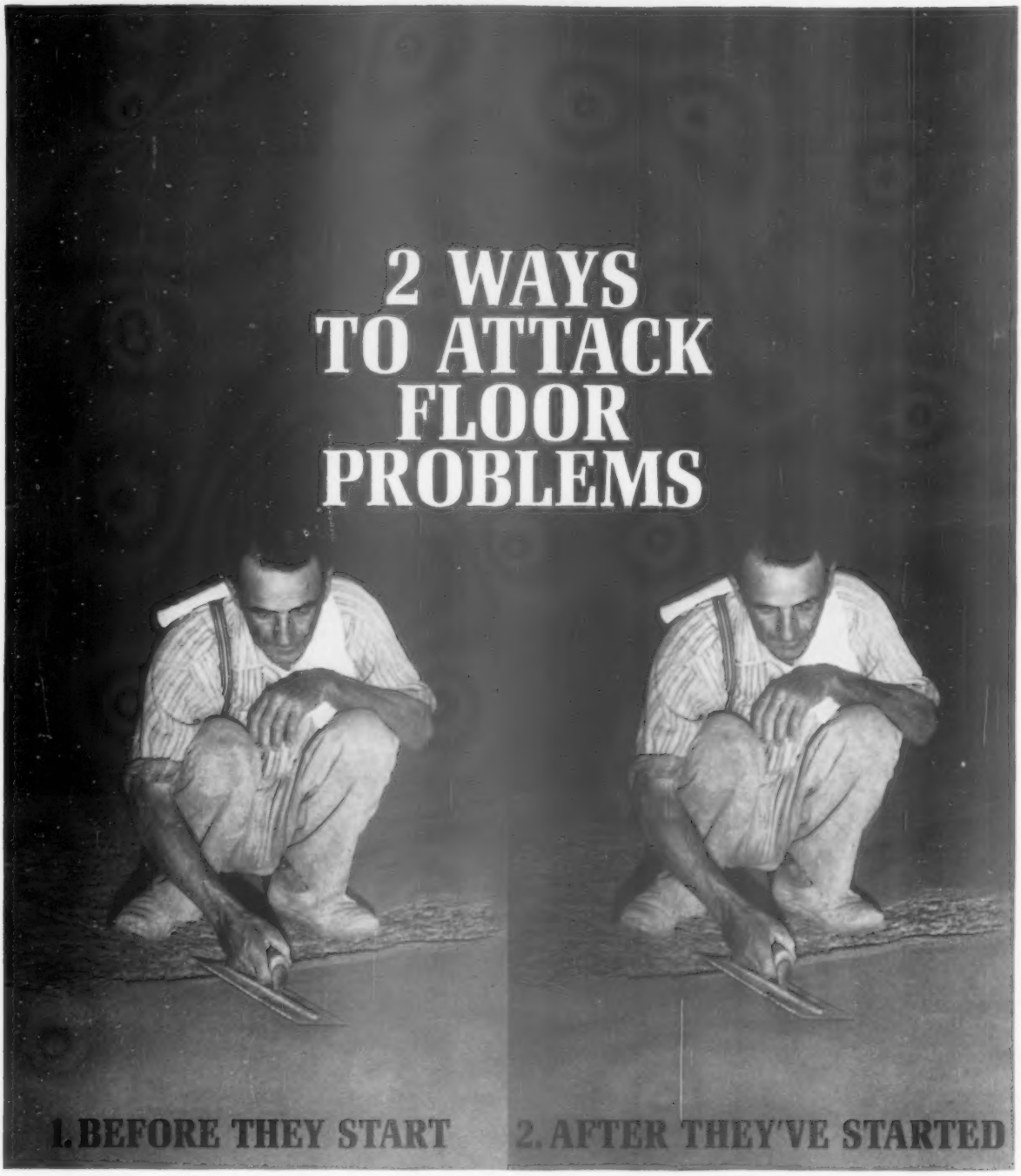

THIOKOL LIQUID POLYMER-BASE MORTARS with epoxies are meeting industry's most serious flooring problems.

IN PLANTS GOING UP—where the manufacturing process is recognized as potentially destructive to conventional materials—liquid polymer-base mortars can be installed originally to avoid frequent, costly maintenance.

IN EXISTING PLANTS—faced heretofore with a continuing cycle of restoration—liquid polymer base mortars have been used for remedial application. These compounds have ended, once and for all, profit-robbing down time, hazards to personnel, unsightliness, and high maintenance outlays.

THIOKOL liquid polymer-base mortar stands up to heavy traffic, abrasion, chemical attack like no other flooring compound. It can be applied over existing surfaces regardless of their composition, and is ready for traffic in less than a day. For complete data, send for Brochure FC-100.

Thiokol®
CHEMICAL CORPORATION
780 N. Clinton Ave., Trenton 7, N. J.
In Canada: Naugatuck Chemicals Division, Dominion Rubber Company, Elmira, Ontario

For more facts Circle 425 on Reader Service Card

FACTORY

Eight feet of space lets the 922 come through with fast clean-up work. Notice the operator sits high and clear, has excellent visibility all around. Lift arms and the load are well in front of him. He's safe and confident and so are others working around him.

Cleaning out bays around open-hearth furnaces, one of many jobs the Cat 922 wheel loader does at this steel mill. Cat Diesel Engines power the loader line, use low-cost furnace oil. Gasoline engines are optional on the 2 smaller models.

For varied jobs—for dependability

SOUTHWESTERN STEEL MILL PICKS A CAT 922 LOADER

Those bold, black letters are pretty familiar around this mill's open hearths. They've used Caterpillar track-type loaders since 1956—ripping out and loading slag, handling coal, etc. Last January they needed a mobile loader. Wheels were the only answer. They picked the new 1¼-yd. Cat 922—a choice indicated by their 6 years of experience with the long-term economy of Cat track-type loaders.

The 922 has put out the performance they expected—or even a little better. It's busy cleaning out around furnaces, stockpiling ore, leveling fill on a new storage yard, maintaining plant roads and cleaning around buildings . . . tough work, light work, tight work.

The 80 HP, nimble-wheeled 922 can work in 8-foot aisles, under 8¼-foot ceilings with safety and precision. Power shift transmission, power-boosted steering and brakes make the operator's commands take effect fast. The basic design of the 922, with the lift arms and the load ahead of the operator, gives him excellent visibility, confidence and safety.

There are 3 Cat wheel loaders, 80 HP, 105 HP, 140 HP (flywheel ratings), with the same wide-open design, same high production features. Your Caterpillar Dealer will be happy to show you the Cat loader for your material handling work. Call him soon.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

For more facts Circle 426 on Reader Service Card

Anywhere in the plant you're likely to see the 922 handling another job. Moving heavy ore up to the railroad crane is just another easy chore for the 922. Bigger production needs can be met with Cat's 944 or 966 loader.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

CAT LOADERS FOR VERSATILITY AND PRODUCTION

New way to save big when you build big

...NEW BUTLER MRF BUILDINGS

Interior Williams and Company, Inc.

•

Interior Vitro-Tech Corp., Hearne, Texas

The age of industrial monuments is ended. Buildings today are engineered to capital conservation and inevitable obsolescence. With these considerations in mind, we invite you to investigate the new Butler MRF building system—the building system that supports management aims and objectives.

Precision factory-fabricated to give you quality control in every detail. Spacious interiors with a minimum of strategically placed columns. Modules of 40′, 50′, 60′ or 80 feet. Bay lengths of 20′, 24′, 30′ or 40 feet. Roof spans up to 240 feet without internal gutters. A metal roof deck so good we can guarantee the roof 20 years, without any maintenance obligation on your part. Three beautiful, factory-colored wall systems of outstanding quality—two of them, factory insulated.

MRF goes up at astonishing speed. Expansion is easy and economical. Even the wall systems can be interchanged. In an MRF you can afford to change your mind. Quality for quality, this is economical construction, with the advantages of custom planning.

Phone your Butler Builder for the full story. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Ask about financing, too. Or write direct.

Williams and Company, Inc., Cincinnati, Ohio • Consulting Architects / Schauder and Martin, Toledo

Alton Box and Board Co., Highland, Illinois

CELEBRATING 60 YEARS BUTLER FABRICATING METALS

BUTLER MANUFACTURING COMPANY

7375 EAST 13TH STREET, KANSAS CITY 26, MISSOURI

Manufacturers of Metal Buildings • Plastic Panels • Equipment for Farming, Transportation, Bulk Storage, Outdoor Advertising • Contract Manufacturing

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. Detroit, Mich. • Cleveland, Ohio • New York City and Syracuse, N. Y. • Washington, D. C. • Burlington, Ontario, Canada

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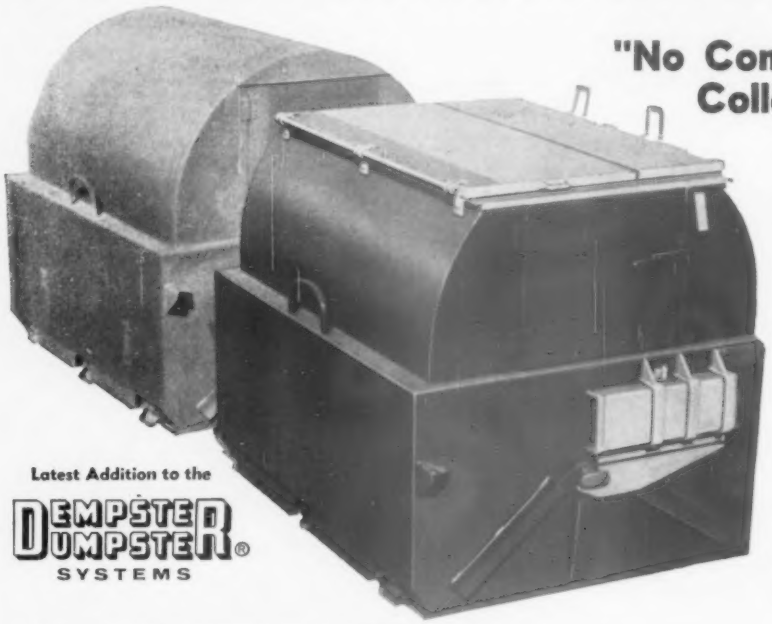
New SUPER DUMPMASTER Handles Converted DUMPSTER Containers...Beats Long-Haul Problem



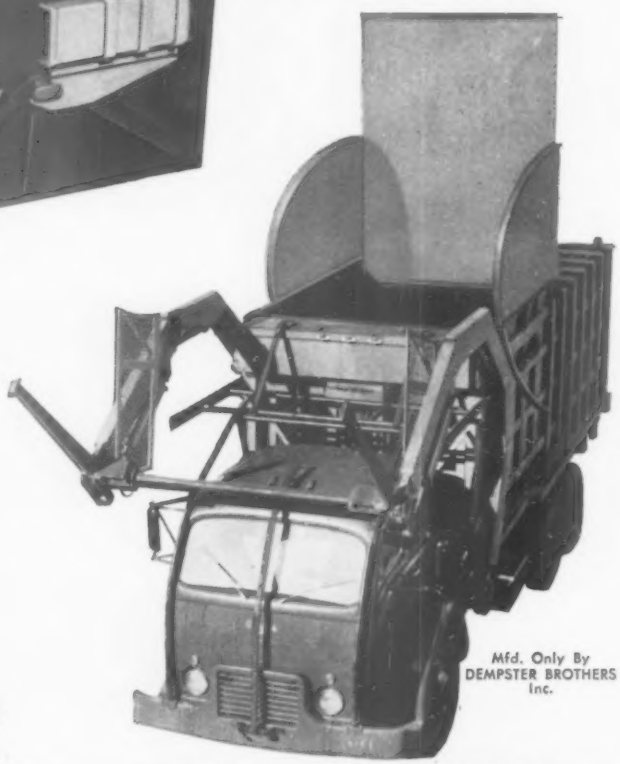
Latest Addition to the DEMPSTER DUMPSTER® SYSTEMS

"No Container Haul System" Collects Refuse on Spot

If longer trips to disposal areas have raised your operating costs, a small investment in conversion kits protects large investments in DUMPSTER containers. The Super DUMPMASTER handles converted DUMPSTER containers up to 12 cu. yd. and all DUMPMASTER containers one thru 12 cu. yd.

Owners of DEMPSTER-DUMPSTER Systems who now face long haul problems due to movement of disposal areas may now convert from their present "container haul" system to the new SUPER DUMPMASTER "no-container-haul" system without abandoning their investment in DUMPSTER Containers.

The SUPER DUMPMASTER makes its rounds to each converted container, mechanically empties the contents into its 30 cu. yd. packer body and compacts the material to a fraction of its former volume with the 85,000 lb. force of its packer plate. Rather than haul each container to the disposal area, the SUPER DUMPMASTER carries the contents of many containers on each trip, cutting collection costs drastically.



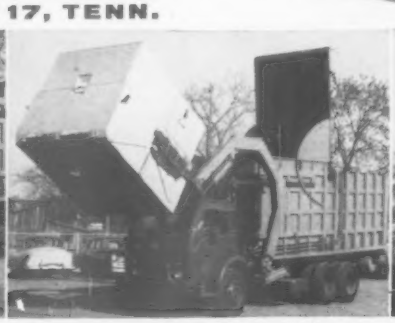
Mfd. Only By DEMPSTER BROTHERS Inc.

Write Today for FREE BROCHURE

DEMPSTER BROTHERS Inc.

DEPT. F-6, KNOXVILLE 17, TENN.

The SUPER DUMPMASTER engages container.



Clearance arms carry it toward hopper opening.

Container is rotated, emptying contents into the compaction body.

STRAPPING TAPE, available in a full range of tensile and impact strengths, applied with a versatile STRAP-IT® dispenser. For carton sealing, bundling, palletizing, reinforcing . . . whatever the packaging application.

PERMACEL®

NEW BRUNSWICK, NEW JERSEY • TAPES • ELECTRICAL INSULATING MATERIALS • ADHESIVES

NOW SONAC ULTRASONIC
LIQUID LEVEL CONTROL
ARO
SONAC
SINGLE SENSOR
A
ARO SONAC
Liquid, rising in vessel, contacts Sonac Sensor probe "A", changing the output of Sensor and actuating relay in Control Unit for operation of shutoff valves and pumps.
ARO SONAC
When liquid in vessel drops to level of Sonac Sensor probe "B", the output of Sensor probe changes, and relay is actuated to control pumps and valves for refilling.
ARO SONAC
B
ARO SONAC

Provides uncanny accuracy and dependability with installation ease and economy

Now, performance no other liquid level control system can offer is a practical reality with new Sonac Ultrasonic Single Sensor System. Sonac is unaffected by foam, liquid viscosity, specific gravity or vibration. The sensor is inherently explosion-proof, and models are available to cover the range from −425°F. to 450°F. Amplifier is fully transistorized, and sensing unit is hermetically sealed in stainless steel, thus maintenance is seldom needed. Sensitivity is adjustable to provide repeatable *accuracy of liquid level control to .005".* Normally, two Sonac Single Sensor systems will be required for high-low control. Installation is easy, and a variety of accessories is offered.

See your ARO distributor for a demonstration, or write ARO for complete information.

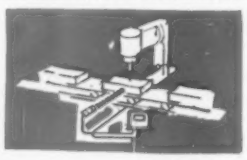
(Sonac is the registered trademark of the Delavan Mfg. Company.)

ARO®

THE ARO EQUIPMENT CORPORATION
Bryan, Ohio

Aro of California, 3141 S. Grand Ave., Los Angeles 7.
Offices in All Principal Cities

SONAC Two-Sensor System
Counts, detects, senses and switches
Operates under conditions that foil other sensing devices. Requires no light, has no filament to burn out, will operate in contaminated atmospheres, darkness . . . and can even be piped through flexible hose or tubing. Get complete information from your Aro distributor, or write Aro.



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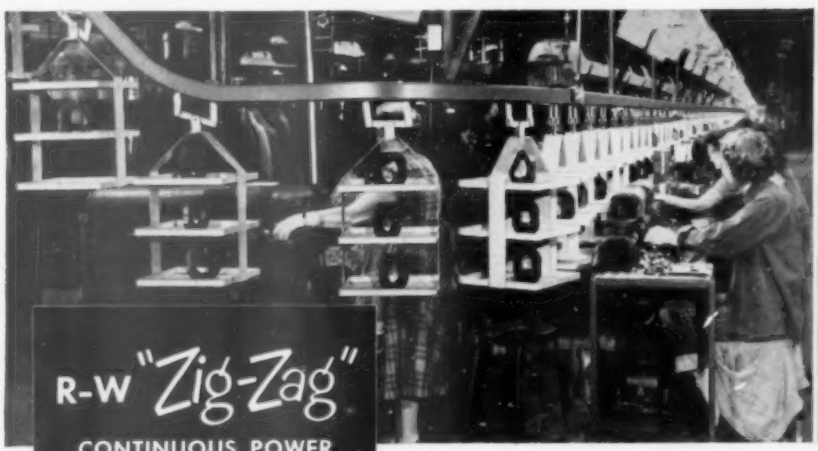
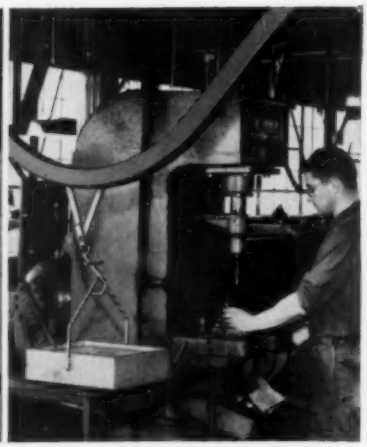
At long production lines or individual work stations...



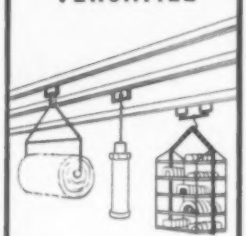


R-W "Zig-Zag" CONTINUOUS POWER CONVEYORS will save you TIME, LABOR and DOLLARS!

From electronic devices and TV Tubes that require "gentle" handling to wearing apparel, foods and rugged industrial products—an R-W "Zig-Zag" Conveyor offers a time and cost saving overhead materials handling system. Equally adaptable for small, special purpose conveyors or huge "door-to-door" plant-wide systems that convey components and products from receiving, through all production processes, finishing operations and on to shipping. "Zig-Zag" Conveyors offer a time-proven method of increasing production and lowering overall manufacturing costs.

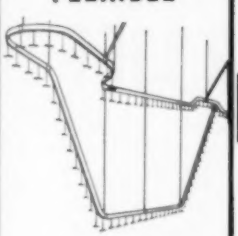
CHECK THESE IMPORTANT "Zig-Zag" ADVANTAGES AND FEATURES

VERSATILE



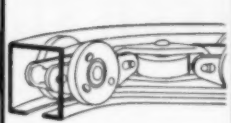
... applicable to industrial plants, warehouses and commercial operations of all types and sizes—no matter how large or small. Efficiently conveys unit loads up to 125 lbs. of products, parts, components, etc. at speeds of one inch to 100 feet per minute ... the only conveyor offering a proven multi-speed drive unit.

FLEXIBLE



... in fact, the most flexible conveyor in its class. May be installed to move up, down, in, out and around. Ideal for all types of overhead materials handling ... efficiently and economically conveys products from receiving, to inventory through all production processes, finishing and finally to shipping. Saves time and costs "all the way."

RUGGED



... furnished in one, top-quality grade ... inferior components are never substituted. "Zig-Zag" consists of a continuous chain of alternate horizontal and vertical wheel units which travels through a rugged steel track. Chain, track, power units and accessories are all "designed for each other" for years of dependable service and trouble-free operation.

RE-USABLE

... "Zig-Zag" systems may be changed, expanded or relocated with almost 100% reusability. Economical to purchase and install ... plant personnel can easily "self-assemble," install and later relocate a "Zig-Zag" System. "Zig-Zag" will meet your needs now—and for years to come. May be later incorporated into an R-W "Twin-Trak" Automatic Dispatch System.

STOCKED

... in most metropolitan areas. Permits *immediate* shipment of all components for your "Zig-Zag" system. When necessary a complete system can be installed and operating in a matter of days. R-W's nation wide staff of factory trained, materials handling specialists are near by to take care of any service that may be necessary ... eliminates unnecessary downtime.

An R-W Sales-Engineer, at no obligation, will gladly survey your plans or facilities and submit a plan showing how "Zig-Zag" will best solve your materials handling problems. Write today for complete information.

Richards-Wilcox

MANUFACTURING COMPANY

MATERIALS HANDLING DIVISION

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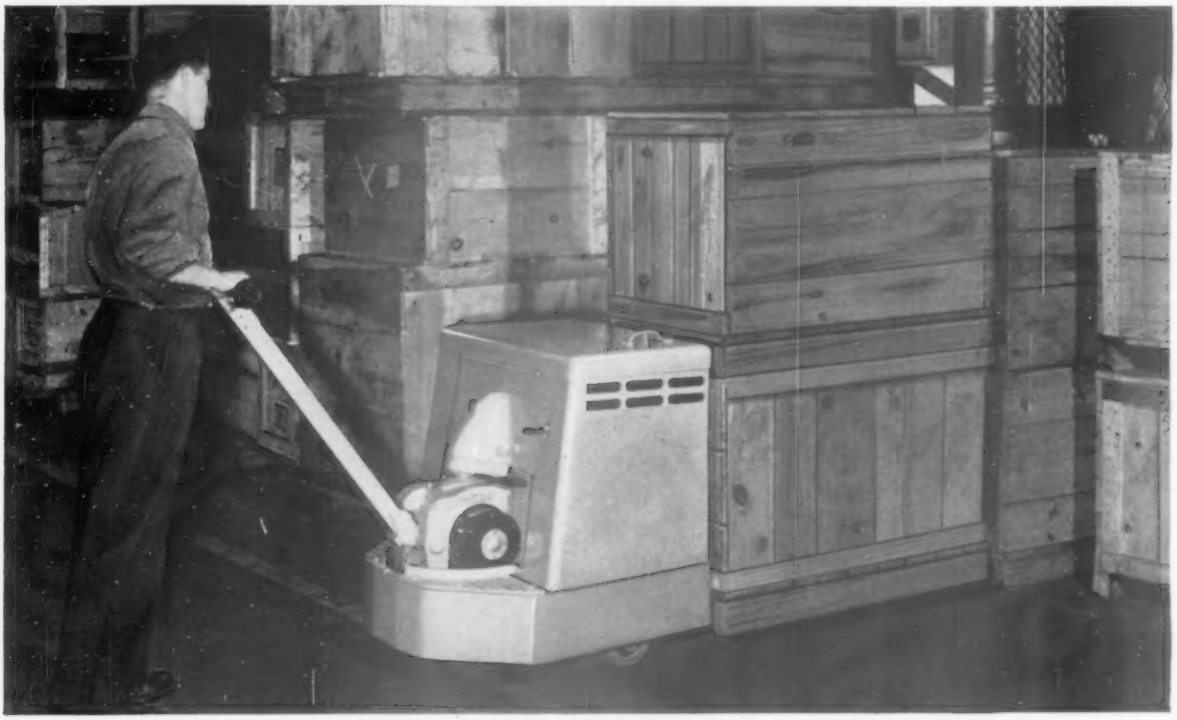
EXIDE POWER PACKAGE

Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

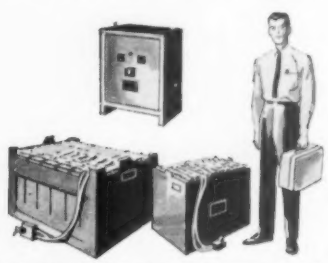


Extra economy assurance for your new walkie-type truck—the Exide guarantee of battery life equal to truck life.

BATTERY GUARANTEED FOR LIFE OF TRUCK

Let's say you're about to buy a new walkie-type electric industrial truck. You want long battery life for maximum economy, and you don't want the nuisance of ever replacing the battery, if you can avoid it. Well, this is the Exide offer:

For walkie-type low lift trucks and hand tractors, the recommended Exide nickel-iron-alkaline battery (the type invented by Thomas A. Edison) is guaranteed for the life of the truck—provided the truck remains in your possession and approved maintenance procedures are followed.



The Exide Power Package. Recommended battery and charger from the world's broadest lines—plus factory-quality service to cover both.

This is not a reckless offer. Exide knows from countless actual performance records that these batteries readily give this kind of life. Many Exide nickel-iron-alkaline batteries have been used in walkie-truck service for upwards of 20 years and are still going strong. So the plain fact is that we are simply giving you positive assurance of battery value that is already there anyway.

Long life is one of the characteristics of Exide nickel-iron-alkaline batteries. They have other unique advantages too. They are lighter in weight than other batteries. They give off no corrosive fumes during use or while charging. And they can be stored indefinitely without injury. This is of special value during seasonal shutdowns or other inactive periods. All you do is discharge the battery, short-circuit the terminals and store in a clean, dry place.

Of course, for any type electric industrial truck—walkie, rider, or narrow-aisle—the maximum power economy depends on three factors: the right battery for the job, a charger to match, and needed service. This combination is the Exide Power Package.

Your Exide representative studies your requirements, then recommends the battery best for your needs from the broad Exide line. He is completely objective in determining your needs because Exide offers all types: Exide-Ironclad with tubular positive plates, Exide-Powerclad premium flat-plate, and Exide nickel-iron-alkaline. Exide chargers are available in both motor-generator and silicon rectifier types and in sizes to cover all needs. Exide service men are coast to coast, all factory trained on batteries and chargers.

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FACTORY

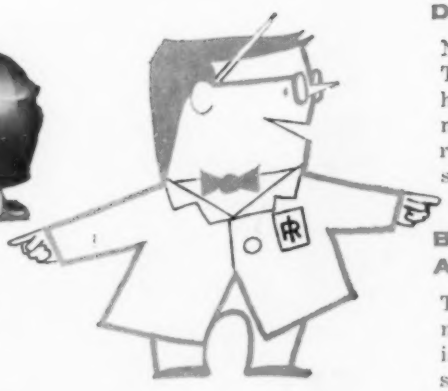
For more facts Circle 432 on Reader Service Card

when you discuss pumps what does

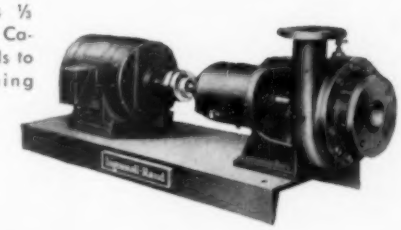
NPSH

mean to you?

Close-coupled Motorpumps ¼ through 75 horsepower. Capacities to 3200 gpm—heads to 650 feet. Also self-priming models.



Cradle-mounted pumps ½ through 100 horsepower. Capacities to 3200 gpm—heads to 525 feet. Also self-priming models.



Horizontally-split pumps 1½ through 400 horsepower. Capacities to 4000 gpm—heads to 1100 feet.

THE TECHNICAL DEFINITION

NPSH means NET POSITIVE SUCTION HEAD and is the total suction head in feet of liquid absolute, determined at the suction nozzle and corrected to datum, less the vapor pressure of the liquid in feet absolute.

BUT THERE'S ANOTHER MEANING TOO

To trained Ingersoll-Rand sales engineers the technical meaning of NPSH is taken into account every time a pump selection is made. Many other factors including the piping system, current conditions, friction, specific gravity of the liquid, viscosity, etc., are evaluated. And, because we do a most thorough selection job we like to think of NPSH as "NO PUMP SELECTED HAPHAZARDLY." This leads to customer satisfaction, something we are proud of.

When you're having a pumping problem, why not call on an Ingersoll-Rand pump specialist. There's one as close as your nearest Ingersoll-Rand branch office or authorized I-R pump distributor. Perhaps the pump you need will fall within our extensive commercial pump line.

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with the Multi-option Fenwal 536 Temperature Controller

It's so *precise* and yet so *easily adaptable* to an almost endless variety of temperature control applications, you become all but convinced that the transistorized Model 536 was engineered with only your needs in mind!

From its multi-option printed circuit board to its numerous interchangeable components, the Model 536 Temperature Controller spells *versatility*. ON/OFF or proportioning control . . . dial for set point adjustment mounted externally or internally . . . expanded scales for precise temperature adjustment — the 536 offers all these advantages! Five standard temperature ranges from −50 to +600°F . . . separate potentiometer with graduated dial and knob for remote temperature adjustment . . . capacity of 10 amp/110 VAC and 5 amp/230 VAC . . . these choices are also available to you. *And you pay only for the options you need!*

The 536 is sensitive to within 0.1F°. And if you wish to build a multi-point control and indication system — either gradually or all at one given time — you simply combine the Fenwal Model 580 Temperature Indicator with as many 536 Controllers as you require. Thermistor sensors enable fast response and ordinary copper lead wire may be used for connections. Removable interior of the Model 536 allows easy, safe installation and the instruments are smartly styled to perfectly complement modern industrial machines and interiors.

Find out more about how the precise Model 536 Temperature Controller can be adapted to your exact needs by writing to FENWAL INCORPORATED, 256 Pleasant St., Ashland, Mass. Request Bulletin MC-195.

Another example of how

Fenwal CONTROLS TEMPERATURE . . . PRECISELY

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Circle 435 on Reader Service Card for items on next page

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And long after there would be need for *more* wet paint, this Copon coating will be giving protection against corrosion. That's why it's used instead of paint to protect so many "tough spots".

Copon looks like paint, sure. You can brush or spray it on. Even roll it on. But indoors or out, it *stays* on so much longer than paint.

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FOR CORROSION CONTROL

Copon®

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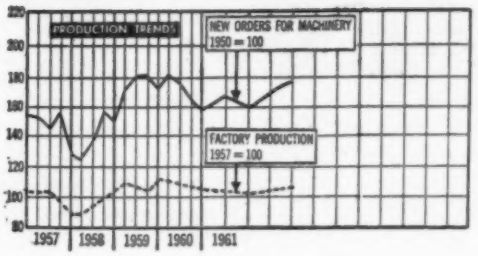
LOOKING AHEAD IN BUSINESS

A FACTORY PRESS TIME REPORT

Indicator	APR.ᵖ 1961	MAR.ʳ 1961	APR. 1960
New Orders for Machinery (exc. elec.)[3]	176.0	169.0	174.0
Contracts for Industrial Construction[2]	133.0	131.0	137.0
Factory Production[3]	105.0	102.0	109.0
Consumers' Prices (cost of living)[4]	127.5	125.7	126.2
Industrial Prices (materials, supplies)[4]	128.0	128.1	128.7
Manufacturing Employment (millions)[4]	15.6	15.5	16.5
Total Employment (millions)[5]	65.7	65.5	66.2
Unemployment (millions)[5]	5.0	5.5	3.7

ᵖ = preliminary ʳ = revised



Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1957 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Labor, Bureau of Labor Statistics.

Off and running—almost

THE OUTLOOK | **Though April figures give optimists a reason to shout, there is still some hesitation about crying "boom." Chances are good, however, that consumer income will go higher. Then the picture will brighten.**

Most economists agree that business has started out of its slump with a bang. How big a bang depends on how you read statistics. In April a broad range of industries stepped up their production more than is usual for early spring.

Total output by the nation's factories, utilities, and mines rose by 3% to 105 (1957 = 100). Factory output stepped ahead an equal amount with durable goods industries adding most to the gain.

Even the textile industry, which had cut its production to the bone, saw a 1% increase in the month.

Groundwork was laid in April for further production gains in the months ahead. The Commerce Department reported that both sales and new orders for durable goods rose 4% in April. This third consecutive monthly rise occurred primarily in steel and autos. Increased defense spending helped, too.

At $14.2-billion, hard goods sales in April were the highest since last September. Backlogs piled up for the third month in a row to the highest level since November of 1960. However, durable sales still aren't up to the rosy levels reached in late 1959 and early 1960. Though definitely moving ahead, business is still a long way from the $15.5-billion durable sales figure for the first quarter of 1960.

The key to keeping the upswing rolling is the consumer. He, too, fared well in April. At an annual rate, the April gain in personal income was $500-million over the preceding month. Notably, this was based on improved wages and salaries rather than government benefits. Factory payrolls rose for the second consecutive month—$1.3-billion to an annual rate of $85.7-billion. The increased pay came mainly from larger than seasonal advances in employment and in the lengthening of the average work week.

Payrolls of construction workers also advanced substantially as better weather permitted construction starts over a wide range of the country.

Consumers are still cautious about parting with their savings, but the tide seems to be turning. Retail sales of automobiles have shown consistent strength this spring even though this year's sales volume is still sagging behind last year. During the first third of May, 18.3-thousand new cars were purchased per day. This first-third figure is the best rate since last November.

In general, retail sales for all types of hard and soft goods have been steady but not exuberant. An early Easter makes month-to-month comparisons of sales gains extremely tricky. There is no doubt, though, that retail sales for the early part of this year have been higher than last, if only slightly. The latest figures indicate that total retail sales in the first four months of this year were 1% above the same period in 1960. With personal income flowing at a fast pace again, consumer sales should strengthen noticeably during the coming months.

WASHINGTON WIRE

A FACTORY PRESS TIME REPORT

PINPOINTING YOUR STAKE IN WASHINGTON THROUGH INSIDE REPORTS ON AFFAIRS VITAL TO PLANT MANAGEMENT.

Major impact of the new minimum wage law will be in the South at first. This is chiefly true of southern sawmills and in tobacco, textile, canning, and container plants. An indirect pressure will also be exerted on wages generally. But union economists expect this to be minimal. Labor Department officials expect some layoffs because of the higher minimum, but this, too, is expected to be minimal.

A minimum wage *decision* by the Labor Department is of more immediate concern to producers of electronic components. The Department ruled tentatively, under the Walsh-Healey Public Contracts Act, that such firms must pay at least $1.23 an hour if they are working on a government contract of $10,000 or more. The decision becomes final in mid-July unless the Department changes its mind. This is not likely. The ruling involves such components as resistors, capacitors, relays, connectors, switches, transformers, coils, reactors, chokes, inductors, etc.

Rep. John W. Byrnes (Wis.), top Republican on the House Ways and Means Committee, reflecting the feelings of the opposition, says this about the Kennedy investment-credit proposal: "It is an unsolicited government handout . . . and would not provide the sound depreciation reform necessary to a program of effective and continued plant modernization."

► **President Kennedy's controversial tax-credit proposal has no chance of passage this year.** The plan (see Washington Wire, May) stirred up a hornet's nest during five days of hearings before the House Ways and Means Committee. All but three or four witnesses objected to Kennedy's plan to spur new plant and equipment. Most industry witnesses agree that what really is needed is further liberalization of depreciation allowances, and nothing more.

Committee members themselves favor a straight liberalization of depreciation allowances. Some kind of incentive bill may come out of committee—and might even get through the House this year. But it will die there.

The Kennedy administration feels that the 1958 welfare and pension fund law is "weak and unsatisfactory." It wants Congress to give the Labor Department new authority to crack down on fund embezzlers. At present, the Secretary of Labor merely receives "summary" reports of fund activities. Complaints of abuses must be initiated by employees. What the administration-sponsored bill would do is require more complete reports, permit the Secretary to investigate and police the multi-billion-dollar funds, and make embezzlement a felony. It has only a slim chance of approval this year. But it may get through in 1962.

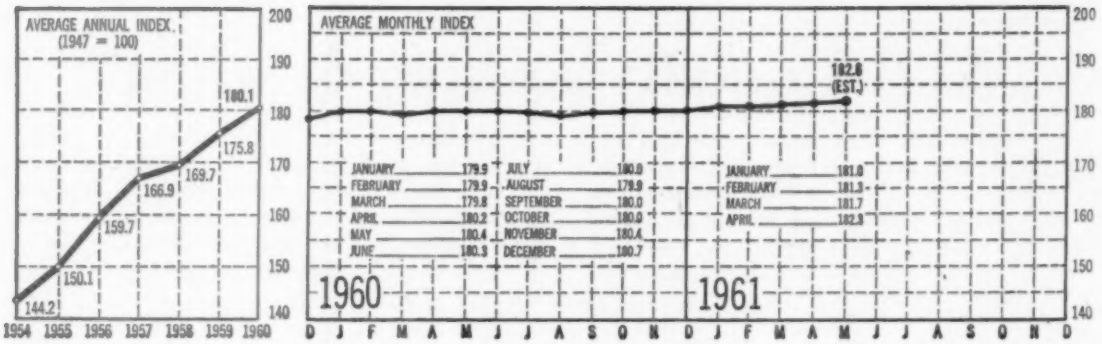
The significance of the government's anti-discrimination pact with Lockheed Aircraft cannot be minimized. The President's Committee on Equal Employment Opportunity, headed by Vice President Lyndon B. Johnson, plans to use it as a lever to "persuade" other government contractors to agree to similar action. The feeling is that if it can be done at Lockheed's plant in Marietta, Ga., it can be done anywhere.

The Johnson committee concentrated on Lockheed because it has a fat new contract with the government which is still cancellable, at least in theory. This was the wedge, though officials never would admit it publicly. The result: Lockheed has agreed to maintain *non-segregated facilities in all nine of its plants,* including eating and recreation facilities. Even more important, Negroes will get into the apprenticeship program so they can move into skilled, higher-paying jobs. With this agreement the Johnson committee feels it now has the impetus it needs to go after other plants.

Apathy surrounding industrial civil defense was given a jolt in President Kennedy's May 25 message to Congress. In it he talked of moving CD directly under the Secretary of Defense; of tripling the $104-million CD budget by 1962; of requiring plants built with federal money to install shelters. Still not clear at press time: Will all plants eventually be required by law to have working CD programs?

COST INDEX OF PLANT MAINTENANCE

A FACTORY PRESS TIME REPORT



Labor costs again lead parade—up

	AVERAGE 1960	APRIL (Preliminary)	MARCH (Revised)
Building and Facilities Index	178.6	197.4	172.7
Materials	140.1	138.5	138.2
Brick	154.9	155.2	155.2
Elec. fixtures	131.9	130.9	130.9
Elec. switches, boards, fuses	183.3	182.5	183.7
Elec. wire, copper	147.0	135.6	135.6
Glass	148.1	147.7	147.7
Gutters, spouts, ducts	180.3	180.4	180.4
Gypsum products	140.9	142.7	142.7
Heating equipment	125.5	121.1	120.5
Lumber	128.7	123.4	120.8
Millwork	156.7	154.1	154.1
Paint	130.2	134.0	134.0
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.7	188.7	188.7
Pipe & tubing, copper	151.5	109.0	111.8
Roofing	113.9	121.3	121.3
Sanitary fixtures	162.4	161.8	161.8
Sash, metal frame trim	137.4	136.9	136.9
Solder	122.5	128.7	123.4
Steel, structural	236.3	236.3	236.3
Tanks, steel	139.6	138.4	138.4
Valves & fittings	167.8	163.7	163.1
Wire mesh	163.8	162.9	162.9
Labor	191.0	197.4	195.7
Carpenters	177.3	183.2	180.9
Electricians	199.4	205.3	204.3
Painters	196.2	203.6	201.9
Equipment Index	184.2	186.0	185.6
Materials	177.6	178.1	178.2
Abrasives	157.9	157.3	157.3
Alloys, non-ferrous	123.2	125.4	119.7
Bars & plate, steel	227.2	227.2	227.2
Bearings	160.0	155.4	155.4
Belting	160.9	166.5	166.5
Bolts, nuts & screws	225.2	236.4	236.4
Chain	187.4	193.8	193.8
Controls (electrical)	183.3	182.5	183.7
Gear-reduction units	181.1	174.5	174.5
Hand tools, mechanics	204.5	207.7	205.6
Lubricants	125.7	125.7	125.7
Motors	145.0	143.2	143.2
Non-ferrous metals	135.8	126.8	126.8
Precision tools	158.2	161.1	158.2
Pumps	235.4	196.9	196.9
Tools, cutting	186.8	184.2	187.5
Valves & fittings	167.8	163.7	163.1
Labor	188.7	191.3	190.5
All mfg. labor	185.1	187.6	187.6
Machine tool labor	192.1	194.9	193.4
FACTORY'S COST INDEX	180.1	182.3	181.7

April marks the fourth consecutive month this year that FACTORY's Cost Index of Plant Maintenance has gone up. The new figure is 182.3, about 0.6 of a point higher than in March. Labor costs again made the difference—being substantially higher in both major components of the Index. Materials costs milled around without creating a definite trend.

With a slight rise in business activity during April, factory managers started calling their employees in for longer work weeks, thus boosting labor costs. In addition, carpenters in some parts of the country managed a hike in their hourly wage scales. This action nudged the index of these costs 2.3 points higher. The index of electrician's labor costs was up 1.0 points, and painter's costs rose 1.7 points. In contrast to the general behavior of labor costs, plant men managed to hold the line at 187.6 in April.

Materials costs exhibited several changes, with the averages of pluses and minuses roughly unchanged from March. In the equipment component of the Index non-ferrous alloys took a 5.7-point jump. Precision tools were 2.9 points higher. Electrical controls were on the down side. Cutting tools finally dropped 3.3 points to end many months of stable prices.

In the building and facilities section of the Index, lumber eased 2.6 points and copper pipe and tubing 2.8 points. In the opposite direction, solder, always a volatile item, added 5.3 points and valves and fittings 0.6 of a point. Over-all, materials prices in this category were 0.3 of a point higher than in the previous month.

Despite the fact that business recovery is speeding up, the outlook for higher prices and labor costs affecting maintenance programs has not changed appreciably. Productive capacity will not be pressed in most industries even by year-end. And the continuing drag of some unemployment will inhibit, but not eliminate, gains for industrial workers.

LOOKING AHEAD IN LABOR

A FACTORY PRESS TIME REPORT

NLRB quietly seeking overhaul

A major overhaul of the National Labor Relations Board is under way. If it goes through quietly, the shift will substantially affect the way the federal agency—the referee in labor-management disputes—handles both unfair labor practice cases and union representation elections.

The Board's goal is to speed up case handling. Despite a gain in formal decisions by the five-man agency—up from 2100 in 1958 to an expected 2900 this year—the case backlog is going higher than ever. Says NLRB Chairman Frank McCulloch: "After two months in office we are further behind—in spite of hard work." Reasons: While unions and employers had filed an average 13,800 complaints a year over the past 10 years, the total has now soared to 23,000 annually. From the time an NLRB trial examiner files an initial decision, it frequently takes up to a year before the Board makes a final ruling.

What the Board wants to do is turn over its decision-making authority to its regional teams. Under the current system, the 68 regional trial examiners make the initial ruling. But if this is challenged by either side, the Board must hear the case. The new proposal would allow the Board to review any decision—but would not compel it to do so.

Part one of the shift is already completed. Authority to determine union representation elections has already been turned over to NLRB's 28 regional offices. This system was approved under the 1959 Landrum-Griffin law and last month the Board formally set the system in motion. Now election dates are set by the regional offices that process the results on whether a group of employees want to be represented by a union.

The Board's appeal to Congress on unfair labor practices will probably meet more resistance. Union leaders generally like the idea. Some employers are likely to resist the change. Here's why:

• Labor unions believe the change will help organizing efforts. They claim that now when an employer discharges a worker for organizing activity—an unfair labor practice—by the time the case is rectified in an order a year later, the campaign has lost momentum and the discharged worker has moved to another job.

• Industry officials are likely to protest such power in the hands of regional trial examiners. They prefer the Board to make such decisions away from the heated atmosphere of the dispute. Employers feel the heat might turn trial examiners against them.

Sounding board for the NLRB proposal is a House labor subcommittee which is conducting an investigation of the Board. The hearings, which had been prompted by union complaints against the agency during the Eisenhower administration, are delving into Board practices and, particularly, its high case backlog. Subcommittee Chairman Roman C. Pucinski (D.-Ill.) favors the Board's proposed speed-up policy.

•

The government's labor anti-racketeering campaign under Landrum-Griffin is showing surprising results. With a minimum of fanfare, the Labor Department's Bureau of Labor-Management reports has handled over 1200 complaints involving unions. Bureau Chief John Holcombe reveals most of these have been settled by persuasion rather than prosecution. However, in the past year nine suits were filed in the courts against alleged fraud in union elections.

Holcombe recites a typical case, where a local union election was overturned with the help of the union's international officers. First the Reform Bureau received complaints of ballot-stuffing by members of the Steelworkers Local 1617 in Youngstown, Ohio. The Bureau investigated and discovered that some members listed as voters weren't even in town for the election. It contacted USW's international headquarters. A new election was run off. In the second vote, the local president—first elected by an 809 to 623 count—was ousted by 933 to 321.

Holcombe claims that fears of union officials over Landrum-Griffin are unjustified. Despite labor leaders' claims that they would be fined and jailed for making innocent mistakes in their reports, "not one union officer has been taken to court for a reporting error." However, Holcombe says the one flaw in the system is the slow handling of cases in court. Because of the time lapse before a decision is reached in the courts, the alleged union violator frequently gets to serve out his full union term before the Labor Department can take corrective action.

SEE LABOR RELATIONS NEWS, PAGE 192

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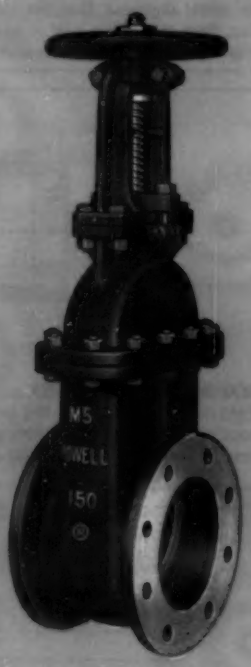
200-pound Bronze Globe Valve—Fig. 102. Union bonnet. Renewable nickel-bronze seat and disc. Sizes, ⅛" through 3". Angle and flanged end valves available.

150-pound Bronze Gate Valve—Fig. 2714. Union bonnet. Inside screw rising stem. Sizes, ¼" through 3" with solid wedge; ½" through 3" with split wedge.

150-pound Bronze Globe Valves—Fig. 150. Union bonnet. Renewable composition disc. Sizes, ½" through 3". Angle and flanged end valves can be supplied.



150-pound Bronze Gate Valve—Fig. 1414G. Bolted, flanged yoke-bonnet. Outside screw rising stem. Solid wedge. Sizes, 2" through 12". Screwed end valves can be furnished.

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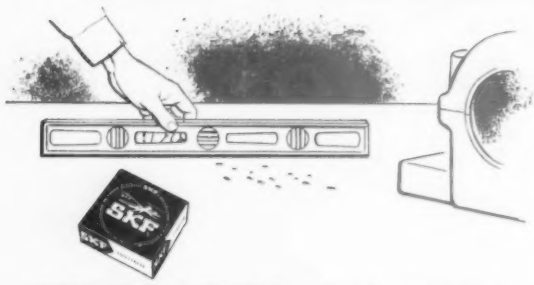
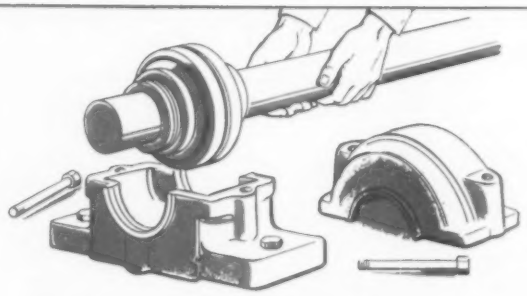
DISTRIBUTOR DAN, the SKF bearing man, says:

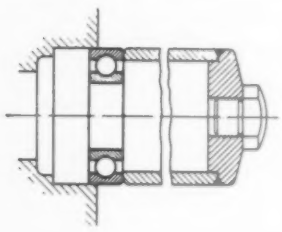
"TEAR OUT THIS PAGE AND READ IT BEFORE YOU INSTALL A BEARING"



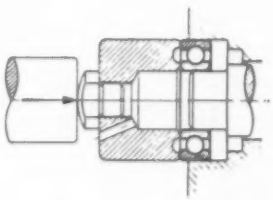
CHECK THE HOUSING SUPPORT first, for surface flatness and horizontal alignment. Then check the housing for correct position. Both checks are vital if you have to mount a non-self-aligning bearing in an independent housing.



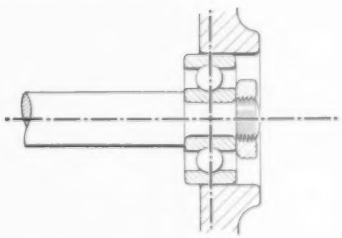
WITH SPLIT HOUSINGS, you simply lower shaft and bearing into the bottom half. Then secure the top half. Straight-through solid housings use bearings with rings that fit loosely with the housing, enabling you to push shaft and bearing into position.



BEARINGS THAT FIT LOOSELY on the shaft generally have a tight fit in the housing. In this case, mount the bearing in the housing by knocking on a mounting sleeve or by pressing. Then insert the shaft into the bearing.



BEARINGS WITH TIGHT FITS on the shaft and in the housing are usually mounted by fitting both rings simultaneously. Apply force to both rings but make sure it isn't carried to the rolling elements. Make sure the mounting sleeve and rings are flush.



START IT SQUARE. When you install a bearing in a solid housing, make sure the bearing is square with the shaft. If it enters obliquely, the more you try to seat the bearing the more trouble you'll have in moving it.

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FACTORY

Conurbation adds to industry's woes

Industry has trouble enough trying to live down its reputation as a generator of noxious fumes, odors, wastes. Now we're told that the growth of "conurbation" is adding materially to the problem, while getting little of the blame.

"Conurbation" is the scientist's name for the phenomenum of merging metropolitan regions. As cities spread out and join the suburbs, the amount of contaminents blown into the air or drained into the streams is overwhelming. And in the absence of the public's awareness of its own culpability in the matter, public criticism is directed at manufacturing plants.

Industry's reputation as an air and stream polluter may well have been deserved a decade ago. Today it is generally unfair to toss the blame for smog and smell into its lap. Examples set by such soot-generating centers as Jersey City and Pittsburgh have conclusively shown how industry can put its own house in order.

Laymen—the men in the street, home owners, automobile drivers, and millions of other private citizens—are hardly aware of what their own concentrated emanations add up to. When the problem becomes critical, as it has in Los Angeles and other communities, the first hue and cry is against operators of manufacturing plants. Only then is the record set straight.

Figures on the cost of air pollution control are hard to compile, but one estimate sets industry's bill at $300-million annually. The figure would appear to be conservative when it's realized that it does not include many collateral charges (such as supervision, maintenance, and overhead). And what does the private citizen contribute to prevent contamination of the air he breathes and the water he drinks? Somewhere in the neighborhood of $25-million each year! Match that figure against the growing belief that in dozens of conurban areas, non-industrial waste accounts for 50% of the contamination.

Industry, quietly and efficiently, has accepted responsibility for its bad ways. Working against stubborn technical and financial barriers, it has made great progress in its own housekeeping efforts. This has been true not only in air and stream pollution control, but also in noise reduction and accident prevention.

Industry has proven to America that it is a responsible citizen. It has made the manufacturing plant safer than the American home. It has made the work place clean and attractive. It is spending millions to confine its wastes. It's about time that the public stops blaming industry for all its problems and grants it credit where it deserves credit.

L. R. Bittel

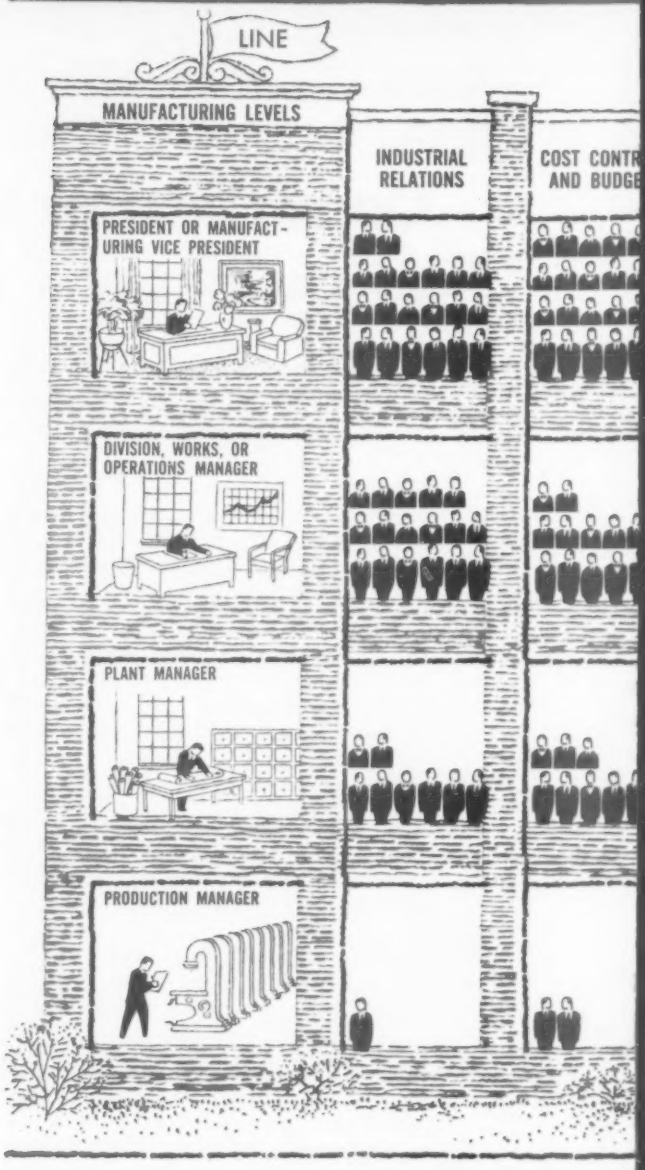
EDITOR-IN-CHIEF

Drive for status characterizes

MANUFACTURING ORGANIZATIONS TODAY

A depth study of how 31 companies handle manufacturing operations

By LESTER R. BITTEL,
Editor-in-Chief, FACTORY



The modified scatter-diagram shown here can aptly be called "The Plant Status Seekers' Achievement Chart." It dramatizes how staff groups have gained favor with the line hierarchy in manufacturing plants. And it provides you with an empirical yardstick for (a) gauging the recognition your plant gives your own function and (b) checking the emphasis your organization places on nine key manufacturing staff functions.

The Plant Status Seekers' Achievement Chart is one pattern that clearly emerged when FACTORY editors superimposed, one on the other, the organization charts of 31 manufacturing companies in an intensive depth study just completed. Companies studied include large and small plants, heavy and light products, high- and low-profit margin industries. (See legend on chart on pages 88-89.)

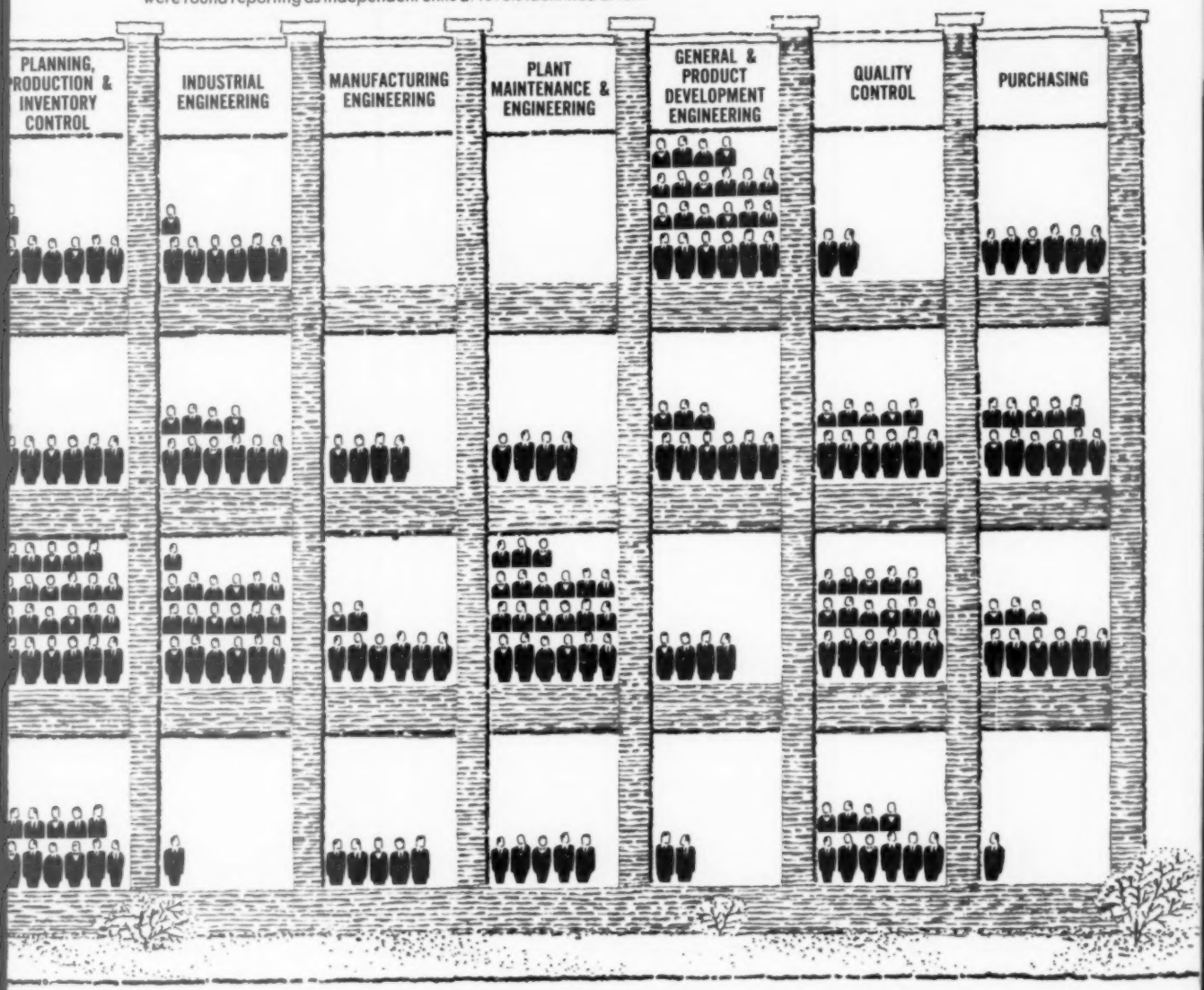
WATCH THESE TRENDS

Other significant observations that point new directions in organization are:

- Basic line-and-staff organization prevails almost without exception among manufacturing organizations.
- Line executives are surrounded more than ever before with staff services that offer expert advice and guidance, and sometimes exert too much control.
- New staff functions—like materials management and data processing—are finding more acceptance in plant organizations, and more jobs to do.
- Some general service functions—like industrial relations, cost control, and general engineering—have become solidly entrenched at the top executive level.
- Other functions—like production planning, plant

SEEKERS' ACHIEVEMENT CHART

Each figure below represents number of times key staff departments were found reporting as independent units at levels identified at left.



maintenance and engineering, manufacturing engineering, and quality control—are finding the climb upward more difficult.

• A struggle for control of plant-level engineering is taking place among industrial engineering, manufacturing engineering, and plant engineering. General or product-development engineering is abandoning this area to concentrate on design problems.

• Specialization within the key staff functions is becoming more sophisticated, more complex. And management job titles still resist standardization.

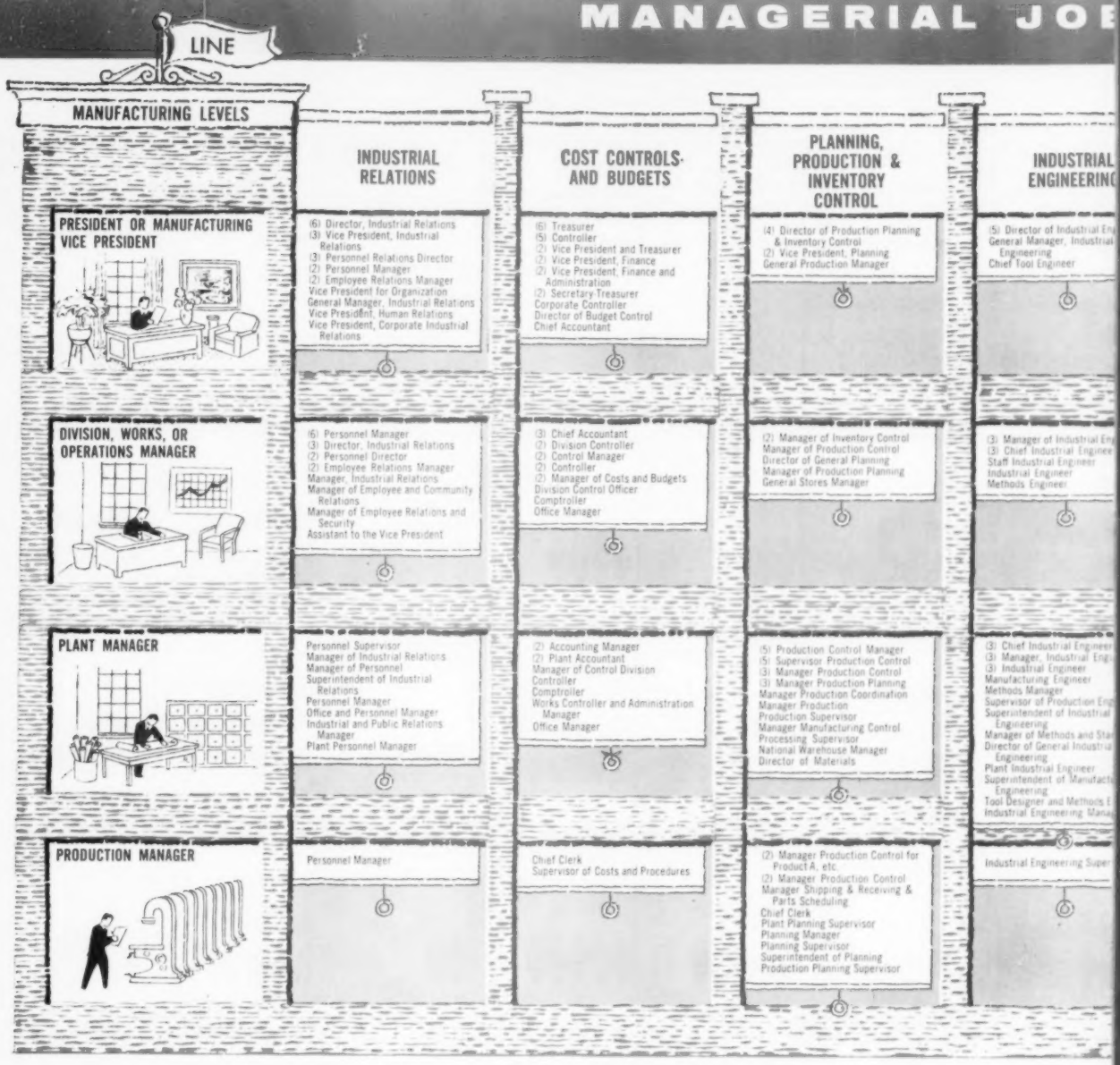
• Organization charts are drawn more for the record than for practical use. Many companies don't use them.

• Continuous change best describes the normal state of affairs in manufacturing organizations. "We are in the midst of change," say 15% of the survey respondents.

• Type of manufacturing problem, rather than size of plant, produces the greatest visible differences among organizations. Widest variances are between process- and fabrication-type plants. (Pages 92-94)

• Despite some deserved criticism, application of committee, task force, or group management is growing. (Page 95)

• People are still the biggest problem of organization. FACTORY's study produced overwhelming evidence of the difficulty in fitting available people into the right combinations with the right kinds of responsibilities, authorities, accountability. (Pages 96-97)



Plants (and their employment size categories) included in the study were:
BENCHWORK: electronics and missiles (1050 employees), electronics (3000)
LIGHT FABRICATION: office equipment (370), silverware (800), signals (240), hardware (1800), fasteners (2800), cans (1200), auto parts (1800), aircraft accessories (900), small motors (160), power tools (390), wood doors (300), shoes (500), lighting fixtures (262)
HEAVY FABRICATION: mechanical drives (690), farm equip-

In smaller plants and in centralized operations, the middle levels of Divisio

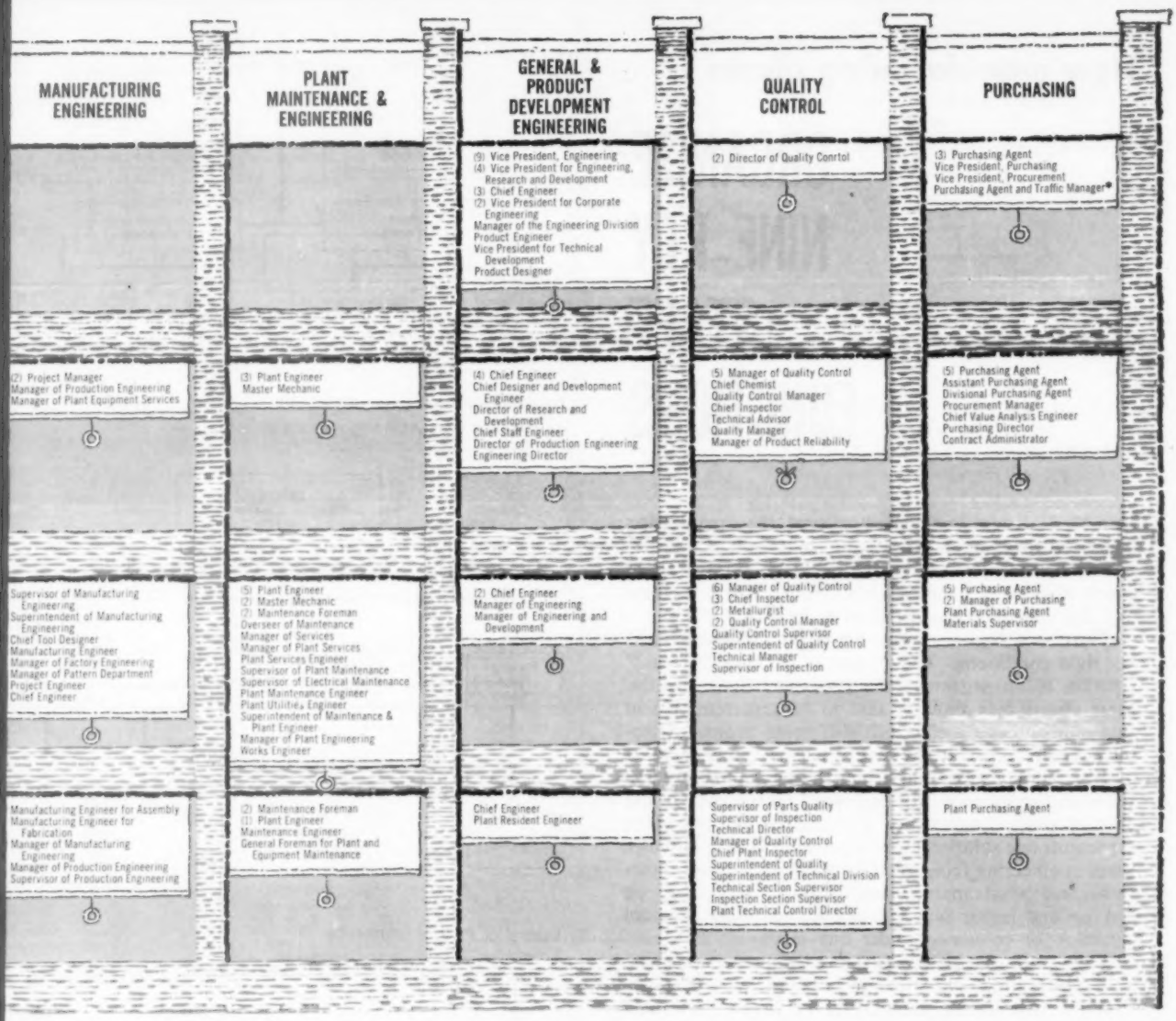
MAZE OF JOB TITLES

reflects struggle to clarify

"What a man does for us is more important than what we call him," says an Ohio assembly plant executive. "A man's title ought to tell others what he does and how important that job is," says the manager of a west coast refinery. In these two quotes you hear the reasons for the proliferation of managerial job titles outlined in the chart above.

Indifference to, or oversensitivity to, the problem of isolating and clarifying job functions typifies the attitudes of manufacturing management. One plant will dodge the issue by calling its personnel director an "Assistant to the Vice President." Another will painfully spell out job duties in a title such as "Manager of Shipping, Receiving, and Parts Scheduling." The former approach en-

TITLE CHECK CHART



ment (600), large transformers (900), engines and compressors (1360), auto frames (4400), ventilating equipment (400), heat exchangers (900)

LIGHT PROCESS: textiles (2440), food (200), toiletries (290), copper tubing (780)

HEAVY PROCESS: bulk chemicals (270), tires (4300), aluminum (2700), steel pipe (150), paper (1878)

*Traffic management was found as a separate function from either purchasing or production control in 5 plants studied—once at the top management level, 3 times at plant level, and once at production level.

Works, or Operations Manager and Plant Manager tend to be combined.

functions and status

courages overlap and over-assignment, whereas the latter may cripple flexibility.

Most of all, job titles are misleading. They tend to imply more or fewer duties than the functions actually contain. Attempts at title-function standardization have appealed mainly to the purists or to the status seekers. Others simply don't much care. Consequently, the paradoxes of titles versus job content are many. Emerging from the welter of confusion and paradoxes, however, are the recognizable divisions of major managerial staff functions drawn on the chart above. It shows the constant shifting of emphasis from one function to another, the temporary amalgams of duties, the rises and falls in status.

How manufacturing plants

ORGANIZE NINE KEY STAFF FUNCTIONS

In a kind of oversimplified shorthand, the organization charts on these pages consolidate industry's definitions of the several manufacturing staff functions. These charts show which duties each function often contains and the relative status of these duties.

The charts, however, must not be viewed as establishing rigid conditions. There appears to be no "normal" solution to an organizational problem. Consequently, these charts may only be said to be representative in that similar ones are found with some degree of frequency in industry. In the case of materials management and manufacturing engineering, the charts represent a popular, but by no means, universal movement. In the case of plant maintenance and engineering, the chart represents one solution to the vigorous debate of whether plant engineering (construed by many as a design function) and plant maintenance (usually viewed as an upkeep and repair function) should be under separate direction or combined under one manager.

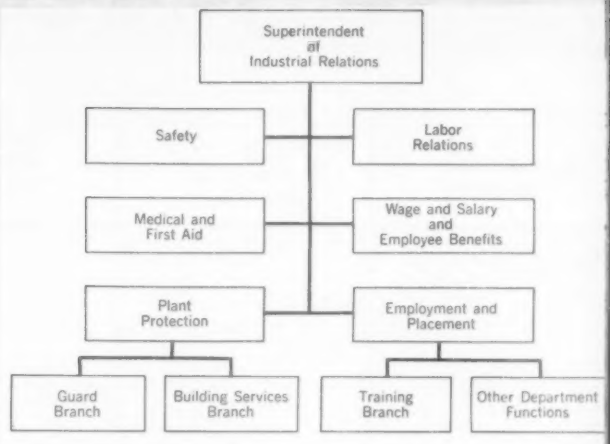
In its study, FACTORY found that the more progressive companies, small and large, go to considerable effort to describe first *all* the duties that might be performed under a function in reaching a plant's profit objective. Next, they group like responsibilities into logical assignments. Only then are the problems of staffing considered. Only then are practical compromises made in matching men and assignments. Thus, the prevalence in small, well-run plants of managers wearing two hats, but wearing them logically.

Just as some managers wear two hats *within* a function, so do many managers handle more than one major function. Or the duties of a single function are split betwen two managers who have other functions as primary responsibilities. Or functions such as industrial, manufacturing, and plant engineering are combined under a single manager.

Not shown here are a number of staff functions considered by some manufacturing organizations to be better separated than consolidated. Chief among these are data processing, communications, operations research, material handling, and traffic.

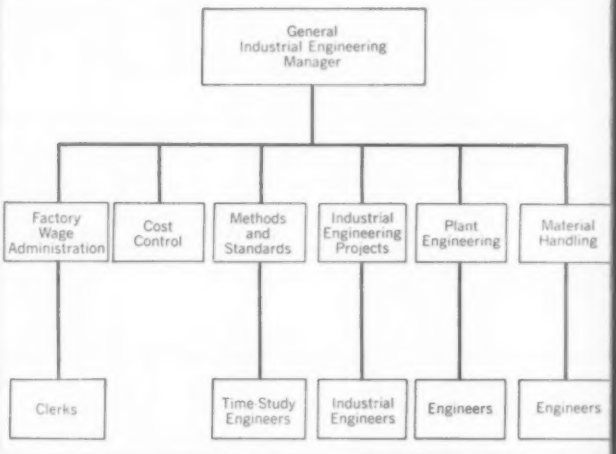
Industrial Relations

. . . Most uniformly organized of all staffs



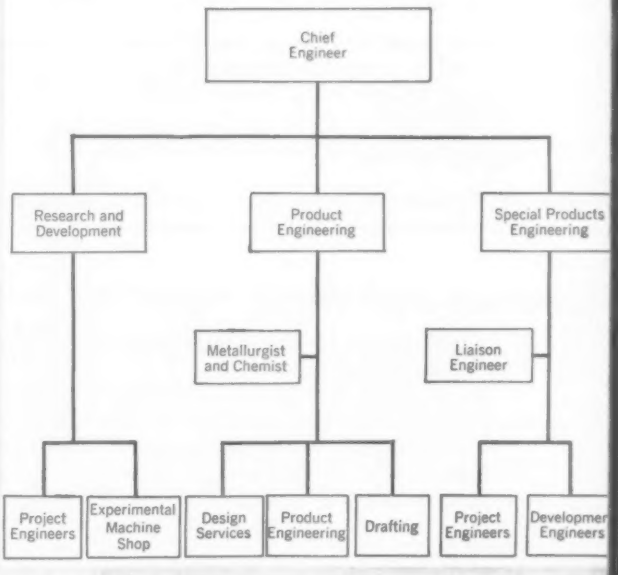
Industrial Engineering

. . . Applying techniques to men, methods, and machinery



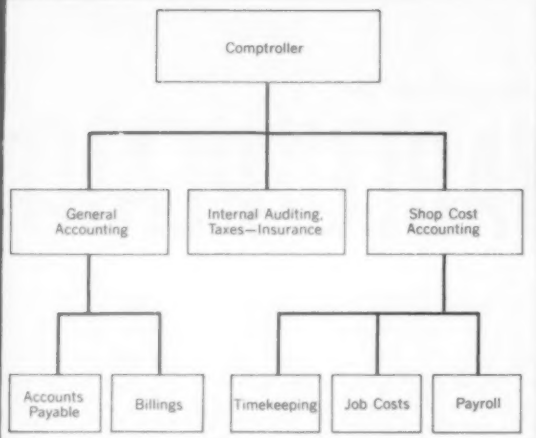
General or Product Engineering

. . . Abdicating plant-level activities to other staffs



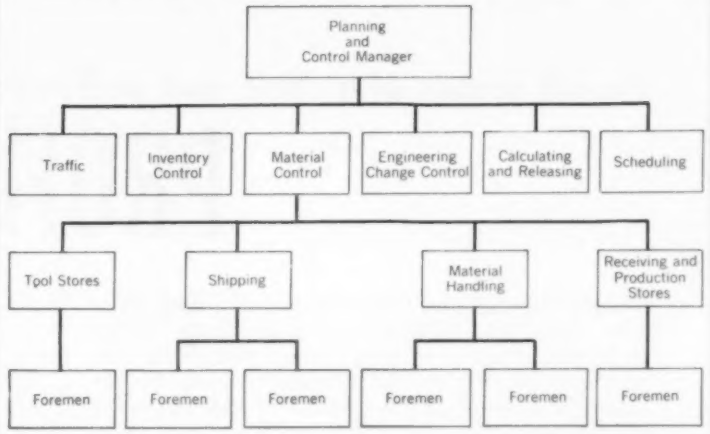
udgets and Cost Control

. . Becoming more shop-oriented



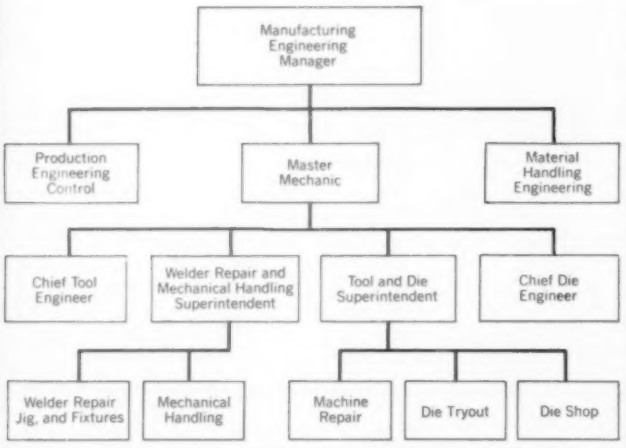
Planning, Production, and Inventory Control

. . . Penetrating deeply into plant organization



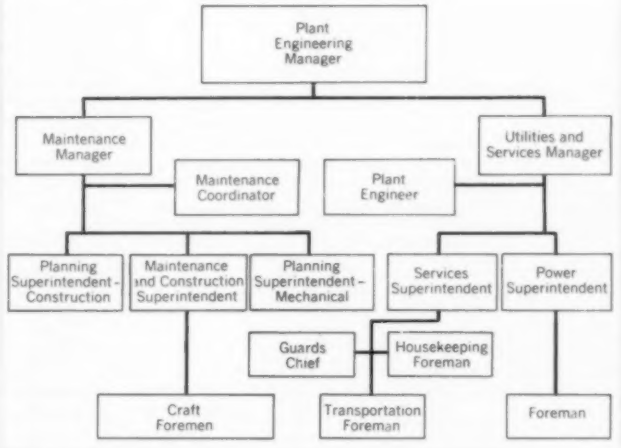
Manufacturing Engineering

. . Specializing in process equipment design and utilization



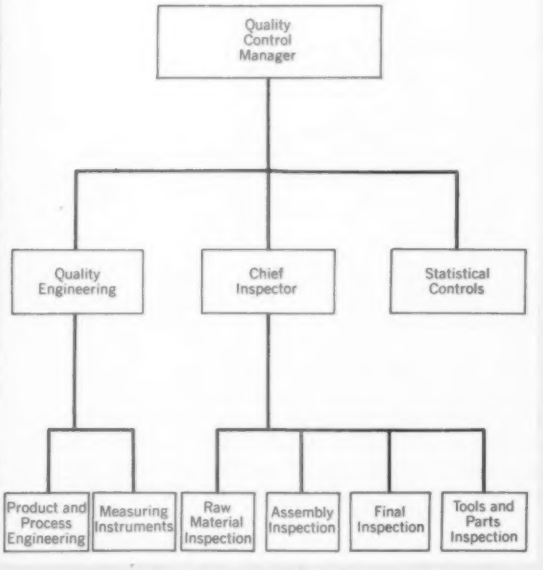
Plant Maintenance and Engineering

. . . Status being granted this small but growing group



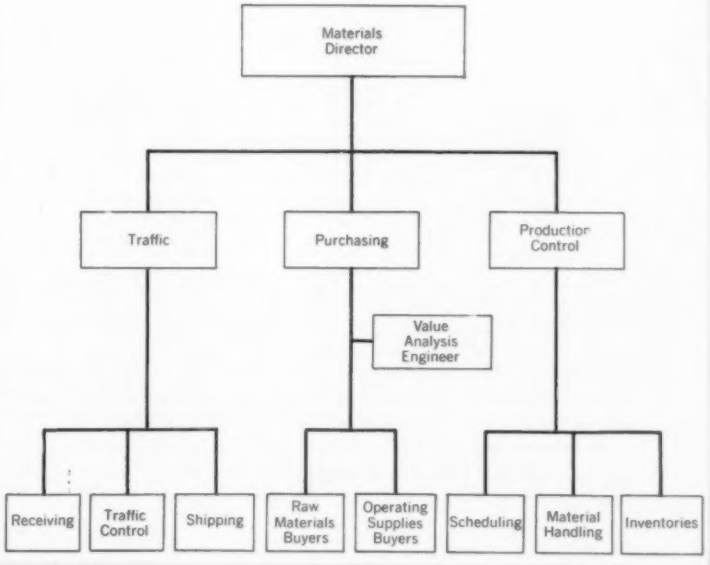
Quality Control

. . . Reliability giving new boost to inspection and statistical controls



Materials Management

. . . A new face, more important task for purchasing



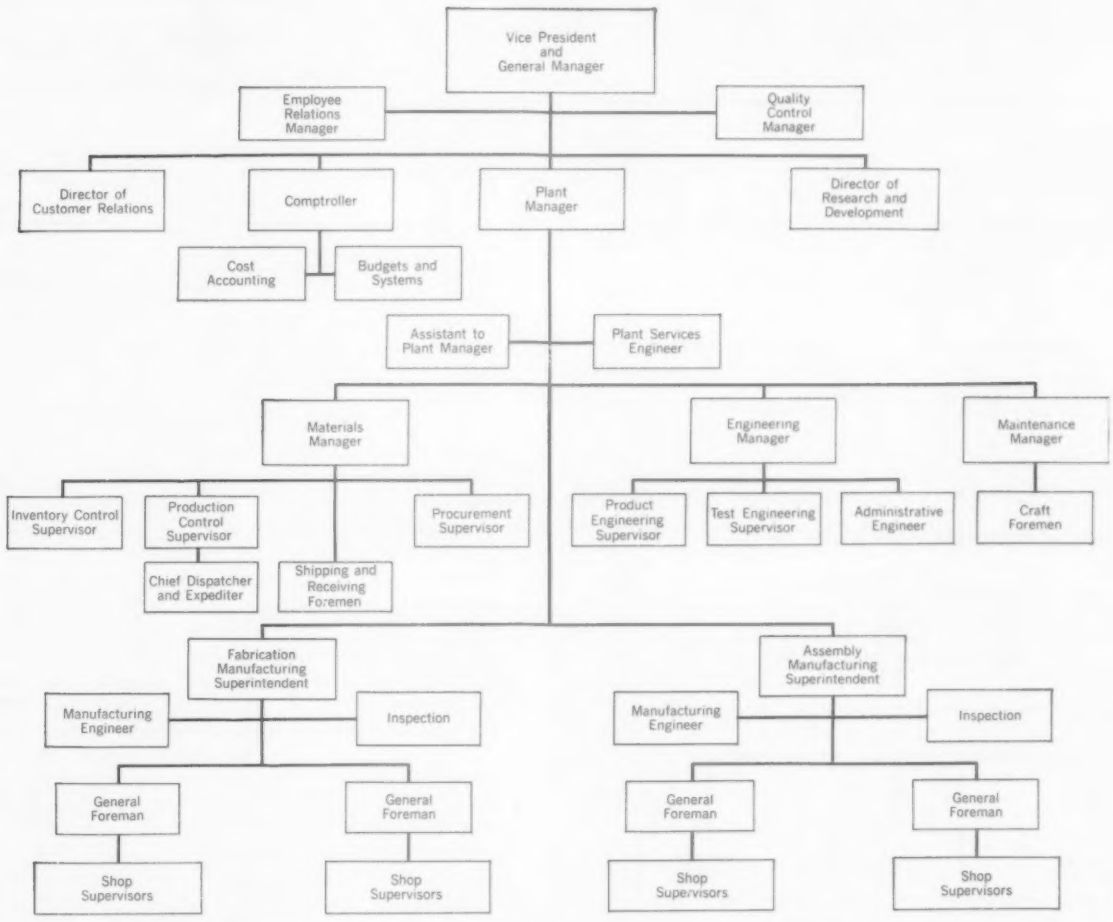
Payoff comes when line and staff work together in . . .

PROFITABLE PLANT

Welding together men who have a diverse complex of jobs, skills, and attitudes into a profitable, unified business machine is probably management's most difficult task. On these and the following pages are five unedited examples of plant management's attempt to carry out this task. The organization charts for these plants were chosen because they make sense, not because they are typical. In fact, FACTORY editors conclude that there is no such thing as a *typical* plant organization.

Granted, there are classic rules of thumb to guide the organization of the manufacturing function (FACTORY, June 1957, "12 Hazards of Organization"). But only a

Bench Work – Machine Shop Plant



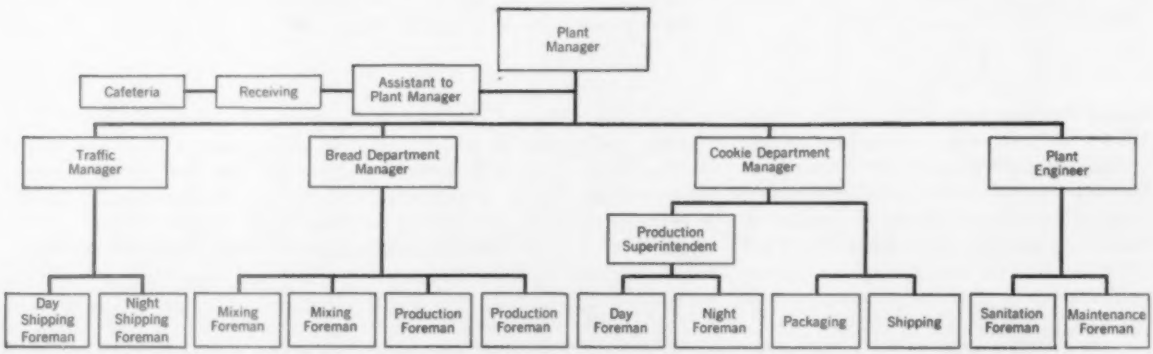
Separation of fabrication and assembly typifies organization in this missile parts plant employing 700 workers—and in most manufacturing plants. Note the high placement of the quality control manager. Not typical, but gaining more acceptance, is the materials management set-up. Attachment of a manufacturing engineering department to each of the major line-production units should also be noted—although most plants prefer other approaches to process improvement. The managers of plant engineering and plant maintenance all report directly to the plant manager; the plant services engineer works on project assignments.

ORGANIZATION

novice in manufacturing management minimizes the overwhelming number of combinations of personality, process, and talent that must be considered before charting the relationships of his own organization.

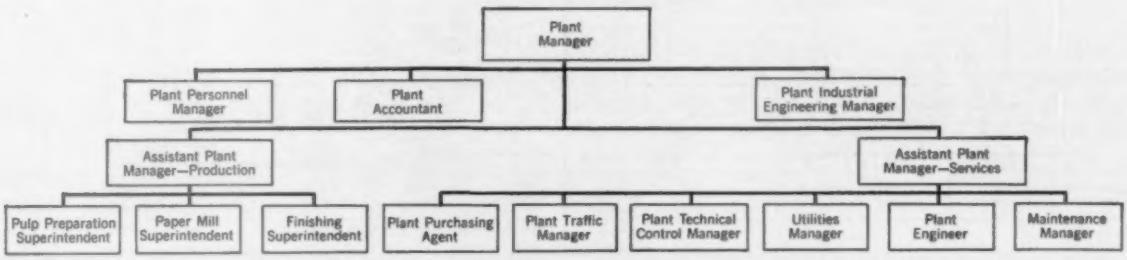
In FACTORY's study, the editors found that the inherent nature of the manufacturing process tends to exert the strongest observable difference between plant organizations. Most typical organization is the bench-work machine shop operation below, left. Four other variations based upon process differences—Light Fabrication, Heavy Fabrication, Light Process, and Heavy Process—are directly below and on the following page.

Light Process Plant



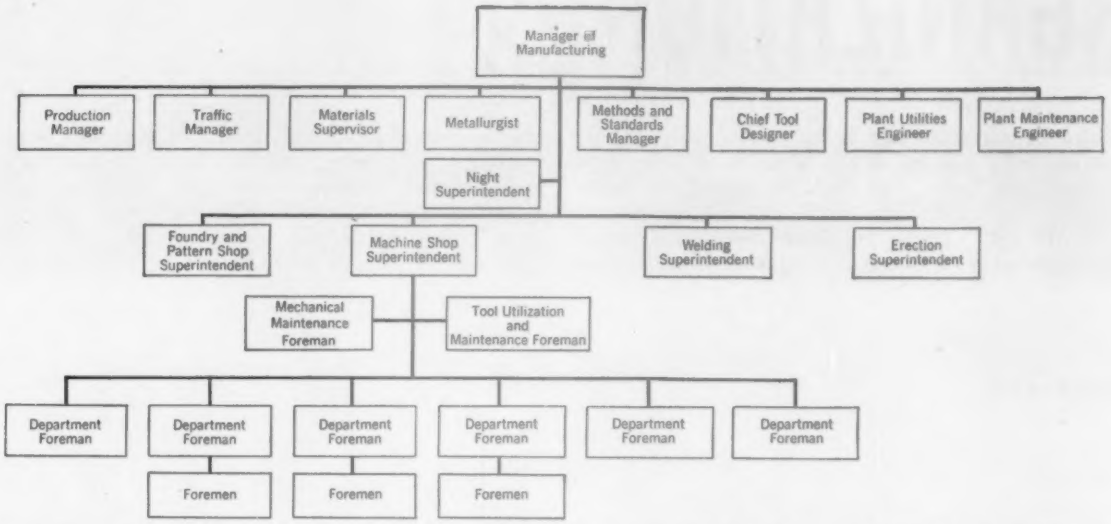
Practicality is the keynote of the organization of this small food plant. The plant is laid out and organized along product lines, with duplicate process equipment for bread and cookies. Sanitation gets special attention, as in most food, pharmaceutical, and toiletries plants. Here the designation of Plant Engineer is a recent recognition of the need for engineering talent to supplement that of the assistant plant manager, who (among other things) is responsible for manufacturing methods and quality control. Note, too, the splitting of receiving and shipping, considered by many to be a good control practice.

Heavy Process Plant



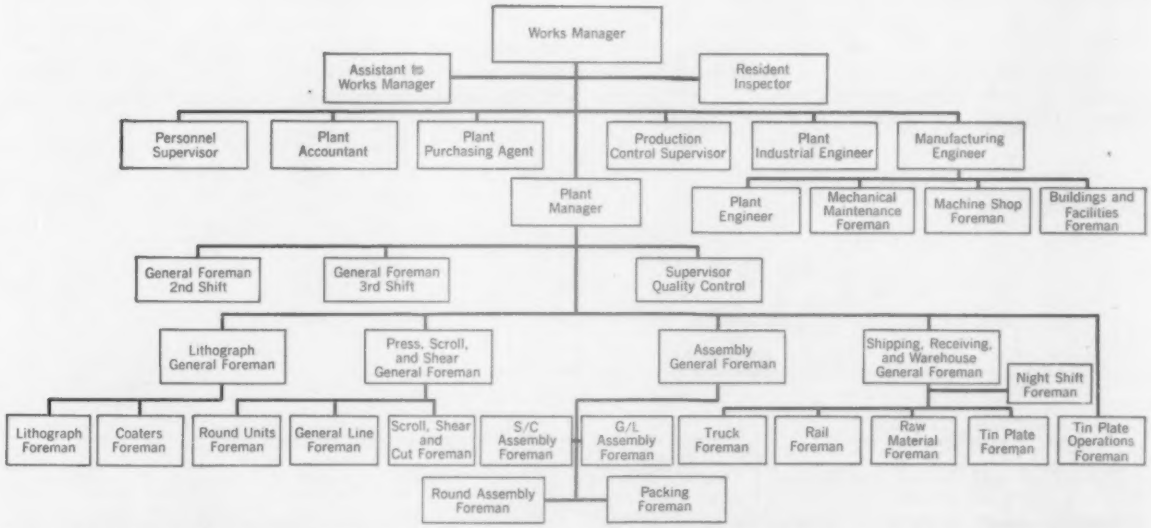
Assigning equal weight to production and service groups characterizes organization in many heavy process plants. Primary metals, bulk chemicals, and petroleum plants often follow similar divisions. This practice gives rise to the popular notion that plant services have an equal say with line people in manufacturing. The idea has merit, but it's far from general practice in bench-work, fabricating, and light process plants. Note the presence (in this 950-man plant) of personnel, accounting, and industrial engineering specialists on the plant manager's staff. Separation of quality control ("Plant Technical Control" here) from the production group is normal; but in many plants this function reports directly to the plant manager.

Heavy Fabrication Plant



Heavy staffing supports four line departments of this 1300-man job shop. The plant makes engines and compressors, needs long lead-time for products. Four line departments are organized along detail of machine shop, shown here. Materials Supervisor handles storage, shipping and receiving, does no purchasing. Work of the Chief Tool Designer and the Methods and Standards Manager is closely allied, as is that of the Plant Utilities Engineer and the Plant Maintenance Engineer. (Note "area equipment" maintenance groups assigned to machine shop.) The challenge to this kind of plant is to organize along assembly- or product-line basis.

Light Fabrication Plant



Process-layout dominates organization in this high-speed can-manufacturing plant. The trend, however, in many plants is to break out long-run items for product layout. (Note that "round units" under press, scroll, and shear are managed this way.) All other items are handled job-shop fashion through progressive stages of process. The industrial engineering group in this 1200-man plant supervises production methods and standards. The manufacturing engineering group handles maintenance, machine shop, and plant engineering for buildings and services. Shipping and receiving is broken down into truck and rail groups.

COMMITTEES— everywhere you look—

It's fashionable to kid about committee management, but few plants have found a better substitute for resolving the multitude of plant problems that affect more than one plant activity.

"A couple of years ago committees were so popular around here that we just about had to have a meeting to get a window closed. Now the pendulum has swung the other way," says the division manager of a nationally known fastener company. These are the sentiments of most of the respondents to FACTORY's survey. But the facts don't bear them out.

Two-thirds of the companies studied retain three or more standing plant committees. One plant (a small one at that) has eight. And pretty nearly everybody admits to the use of dozens of informal task forces. These are groups made up of two or three departmental managers for the purpose of bringing expert knowledge to bear quickly upon problems that overlap between departments or that have plant-wide implications.

Prevalence of committee-type activity should come as no surprise. Reason for it is not the desire to buck-pass or share accountability (which are the ones cynically offered). Examination of any of the charts and diagrams on the preceding pages should affirm the obvious:

- Division of management activity is so great that rarely can a single line manager know enough to make a decision without first getting advice or information from his staff.
- Rarely can a staff group act on a decision without first exploring implications and getting tacit approval beyond its own empire.
- Everything known about plant operations today points to the increasing inter-dependence and inter-relationship between all the line and staff functions. Coordination of these activities is at a premium.

WHICH KIND OF COMMITTEES FOR YOU?

Even the nay-sayers among plant management concede the need for at least one "operating" committee that meets regularly. One company describes as the principal purpose of this group "the interchange of badly needed inter-departmental information and plans, dealing with main policy decisions and over-all plant direction." In Detroit, an auto accessories plant tells of its indispensable weekly Production Board meeting: "It takes up matters pertaining to schedules, schedule difficulties, capital programs, maintenance problems, specific production bottlenecks, and the like." A Pittsburgh chemical plant explains how its single standing committee seeds other ones: "Assignments are made to individuals as a result of this committee, and, in effect, additional subcommittees are set up."

Many companies feel they can't do without their Cost Reduction, Fire Prevention, and Safety Committees. A century-old tool manufacturer in New England sees that the following serve on these committees: plant managers, manufacturing department superintendents, department foremen, and blue-shirt employees.

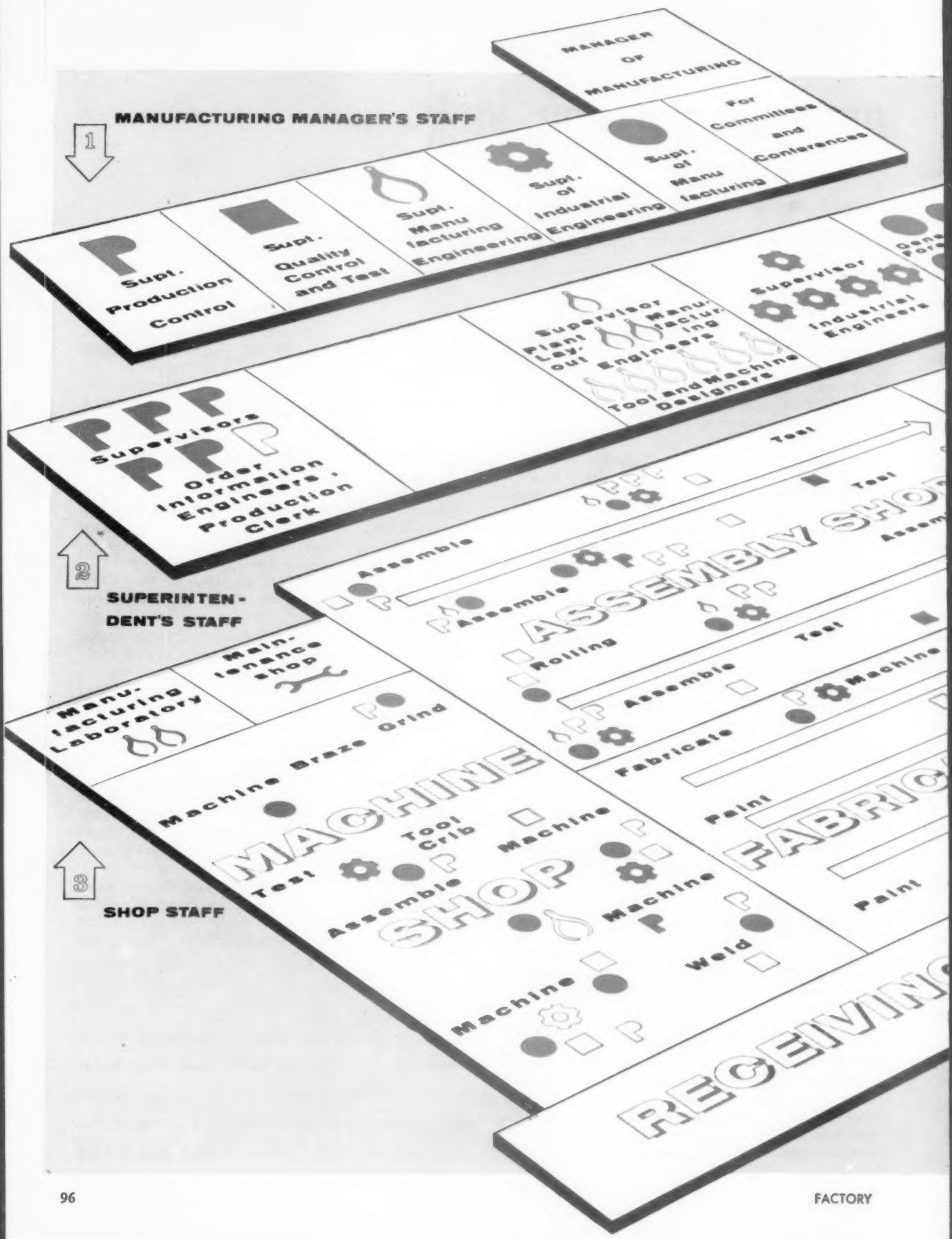
Another company assigns its plant manager, plant engineer, quality control director, chief industrial engineer, and value analysis engineer to a Profits Improvement Committee. And then develops, in the various plant departments, similar subcommittees.

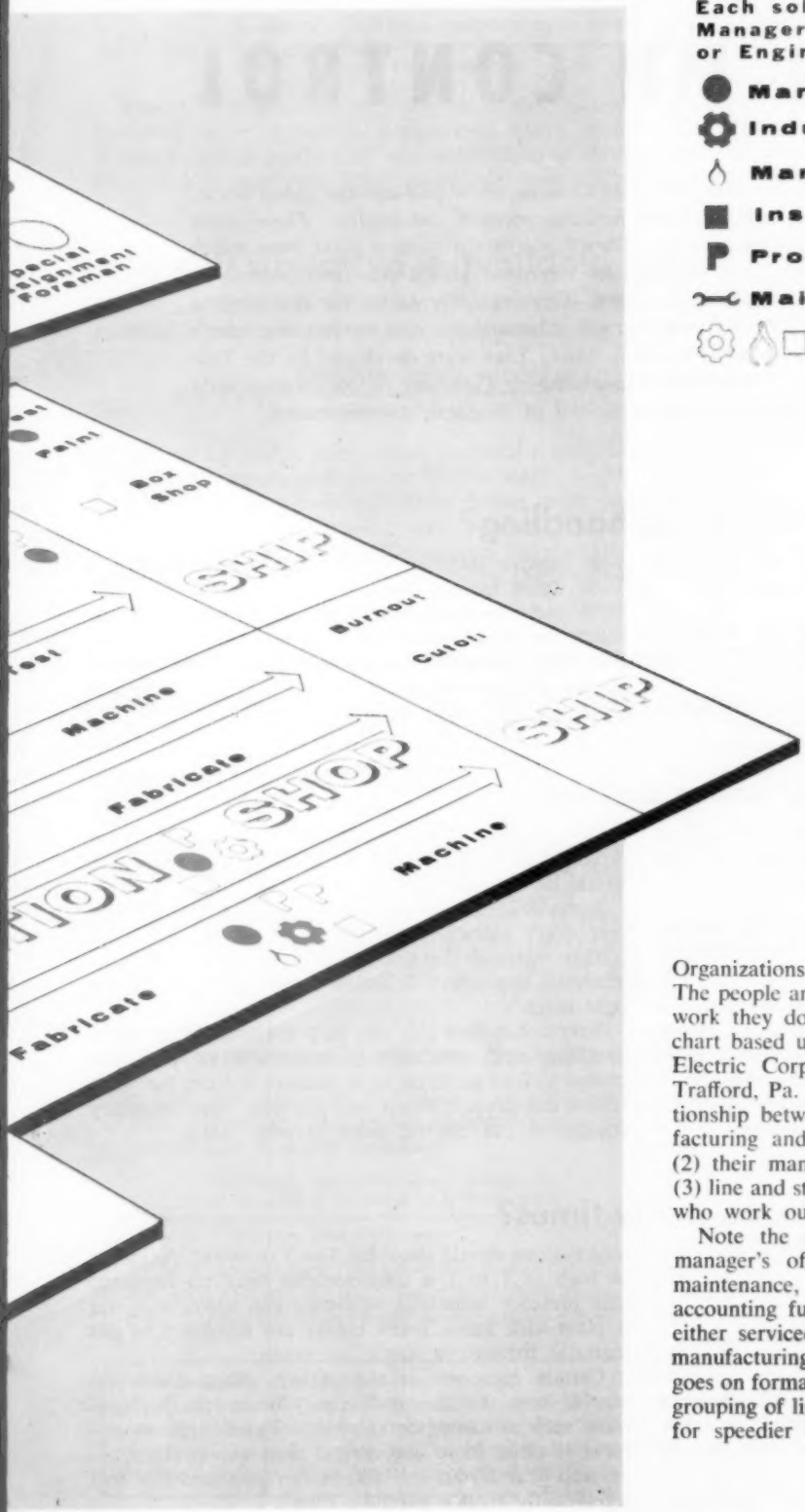
A Chicago office equipment manufacturer has a Communications Committee just to discuss and disseminate current plant information. It also has a Production Planning Committee made up of its manufacturing vice president, works manager, chief of design development, marketing manager, and executive vice president.

A small plant that manufactures electrical lighting equipment regularly uses committees to make critical decisions of a general nature. The names of the committees indicate their objectives: Product Design, Product Planning, Manufacturing Model Evaluation, Manufacturing Release, Tool Disposal, and New Equipment. Membership of the latter committee includes vice president of engineering, vice president of manufacturing, manager of manufacturing engineering, quality control manager, chief industrial engineer, and maintenance engineer.

All in all, you'll be hard put to dodge the conclusion that committees are here to stay. Your problem with committees in the future will not be how to get rid of them, but how to make them less time consuming and more effective.

. . . Committees are eloquent testimony that a plant organization must be far more than boxes built on a sheet of paper. Now, for a visual demonstration of how *people* put bone, sinew, and life into plant organizations, please **TURN THE PAGE**


MANAGER OF MANUFACTURING
For Committees and Conferences
MANUFACTURING MANAGER'S STAFF
1
Supt. Production Control
Supt. Quality Control and Test
Supt. Manufacturing Engineering
Supt. of Industrial Engineering
Supt. of Manufacturing
Supervisors
Order Information Engineers, Production Clerk
Supervisor Plant Layout Engineers
Manufacturing Engineers
Tool and Machine Designers
Supervisor Industrial Engineers
2
SUPERINTENDENT'S STAFF
Assemble
Roll
Tool
ASSEMBLY SHOP
Fabricate
Paint
Machine
FABRICATING
Maintenance shop
Manufacturing Laboratory
Braze
Grind
Tool Crib
MACHINE SHOP
Weld
RECEIVING
3
SHOP STAFF



Each solid symbol represents a Manager, Superintendent, or Engineer.

- Manufacturing Supervision
- Industrial Engineering
- Manufacturing Engineering
- Inspection
- Production Control
- Maintenance

represent inspectors, clerks or technicians

Plant Organization At Work

Organizations come to life only when people go to work. The people are on this month's cover of FACTORY. The work they do is graphically shown on this simplified chart based upon staffing and layout of Westinghouse Electric Corporation's large circuit-breaker plant at Trafford, Pa. The three levels show the physical relationship between the office of the manager of manufacturing and the offices of (1) his immediate staff, (2) their management and engineering assistants, and (3) line and staff supervisors, engineers, and technicians who work out on the plant floor.

Note the accessibility of staff assistants to both manager's office and conference room. (Personnel, maintenance, purchasing, long-range engineering, and accounting functions for this 900-employee plant are either serviced from Pittsburgh or don't report to the manufacturing manager.) Most representative of what goes on formally and informally in manufacturing is the grouping of line and staff men in clusters (Level No. 3) for speedier exchange of ideas and information.

Seven yardsticks to

BETTER MH CONTROL

The trick to reducing material handling costs is in knowing where pile-ups and delays occur, where space is wasted, and where inefficient handling methods are hidden. These seven cost measures provide some of the answers. They'll give you a starting point from which to determine causes and establish a program for improved productivity and profits.

These measures are simple. Although not new, they are collected for the first time in one place. And they're presented in a form that will allow any manager to recognize what's responsible for ever-mounting material handling costs. They were developed by the Yale Materials Handling Division of The Yale Manufacturing Company in cooperation with Prof. James R. Bright of Harvard Graduate School of Business Administration.

Are too many of your men doing handling?

The Material Handling ratio tells you how much of your total effort goes into material movement.

$$\text{MHL Ratio} = \frac{\text{Personnel assigned to handling duties}}{\text{Total operating work force}}$$

This ratio is a starting point from which to compare your relative standing in your industry. Generally, a 10% figure indicates you're doing a fairly good job; 20% indicates much room for improvement. Sometimes this ratio can be a real eye-opener. A large electronics company, for example, found that 56% of its payroll went for material handling. An aggressive attack on the causes reduced the ratio to 25%.

Is your high-priced labor being wasted?

The Direct Labor Handling Loss ratio gives you a good indication of how much direct labor effort is lost when skilled workers are handling materials.

$$\text{DLHL Ratio} = \frac{\text{Time lost by direct labor doing handling}}{\text{Total direct labor time}}$$

To get data needed in this calculation, spot-check a few key production jobs. Estimate the per cent of skilled time lost doing handling. If you feel a more detailed calculation is warranted, conduct a work sampling study. But the first method is usually all that's needed to pinpoint areas needing improvement.

By and large, if your ratio runs 15% or more, your direct labor handling costs are excessive. A 5% figure would be a good target to shoot for.

Some of the causes of a high ratio: handling systems that don't efficiently deliver materials to the work station, materials that don't come in the right containers, materials that aren't delivered to the right spot at the right height.

Simple handling aids can help cut your direct labor handling cost drastically. Inexpensive hoppers and chutes to feed material to or remove it from the work station can prevent delays and pile-ups. Supplementary equipment can do the same in other areas.

Do you handle materials too many times?

The Movement/Operation ratio tells you if workers are going through too many motions.

$$\text{M/O Ratio} = \frac{\text{Total number of moves}}{\text{Total number of productive operations}}$$

Since this ratio also indicates the over-all efficiency of your handling plan, you need only apply it to a few key products or parts that typify major categories of operations.

The target there should be a 4-to-1 ratio. Conveyorized systems should shoot for 3-to-1 or better. Anything as high as 7 to 1 is unreasonable since no company that pretends industrial efficiency can claim that, on a plant-wide basis, seven moves are necessary to put material through a single operation.

Certain locations or departments often cause the trouble here. Or the trouble may be in specific functions such as testing or shipping. Finally, idle equipment is often more economical than excess labor, so revamp your layout and add extra equipment if it will significantly reduce handling time.

How much production time are you losing?

The Manufacturing Cycle Efficiency ratio suggests how efficiently your plant operates as a system.

$$\text{MCE Ratio} = \frac{\text{Sum of all production operation cycle times}}{\text{Elapsed time in the production system}}$$

This ratio is generally very low since the "sum of operating times" is usually a matter of hours, while "elapsed time in production" can turn out to be days. Nevertheless, poor cycle efficiency reduces your ability to respond to orders and indicates a great deal of slippage in the system.

Very few job shops show a ratio of 10%, while some drop to fractions of 1%. This is shockingly inefficient. Causes are inadequate production control, poor layout, and faulty communications. Bottlenecks, backtracking, and order pile-ups are the result. Sometimes a major cause of delay lies in one department or machine, or a move between buildings. Here, a little digging into methods can work wonders.

Can you stretch your available space?

The Space Utilization Efficiency ratio measures how effectively your enclosed space is being used.

$$\text{SUE Ratio} = \frac{\text{Cubic feet usefully occupied}}{\text{Net usable cube}}$$

To find net usable cube (space potentially available for productive use), multiply the interior width, length, and height of your building. Then deduct cubic feet lost through factors beyond your control. Include trusses and columns, required clearances for sprinklers and utility pipes, stairwells, and doorways. Don't deduct factors that can be controlled: aisles for working areas, transfer points for materials, and vacant air space.

Space utilization figures vary extensively. Good warehouse installations show a 60% figure, but this is lower where item quantity is small and there are many items.

Materials should be stacked to reasonable heights. Heights of 12 to 16 feet are commonplace today, with 24 to 30 feet in advanced situations. Vertical space at work stations should also be used for in-process storage. Costly cubic space may be wasted merely through lack of high-lift equipment. Many plants are crowded, but this doesn't mean they're full.

Does your equipment run far under capacity?

The Equipment Utilization ratio shows how nearly your production equipment is being used to full potential.

$$\text{EU Ratio} = \frac{\text{Actual output}}{\text{Theoretical capacity}}$$

Efficiency of equipment utilization varies from industry to industry. Prior to automation, many automotive plants assumed a utilization of about 60%. This has now been stepped up to around 80%. In textile plants, efficiencies approach 95%. In some steel rolling mills, 80 to 85% utilization has been achieved and some highly mechanized metalworking plants are pushing toward 80%. On the other hand, ratios in job shops vary all over the lot and are generally much poorer—in some cases less than 40%.

Methods of changing over machines, or rearranging lines might be back of your difficulty. Mounting machines on vibration mounts instead of bolting them to the floor and using quick-disconnect electrical lines can help speed this change-over.

Finally, the big lesson drummed home by automated plants is the urgent need for maintenance crews to minimize both planned and unplanned shutdowns.

How much aisle space do you really need?

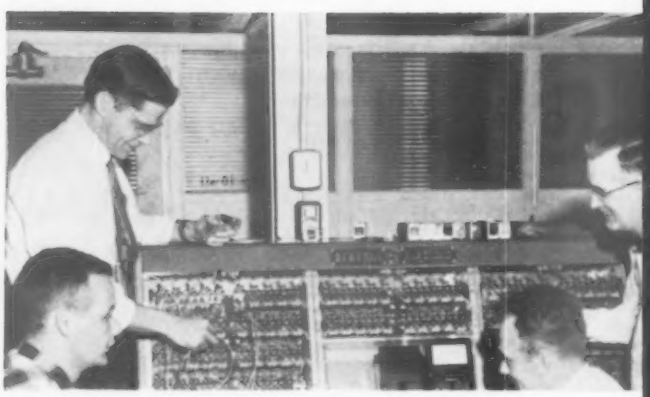
The Aisle Potential ratio highlights your opportunity to pick up building space by use of developments such as narrow-aisle handling systems.

$$\text{ASP Ratio} = \frac{\text{Current aisle floor space, minus theoretical optimum aisle floor space}}{\text{Current aisle floor space}}$$

There is no standard figure for which you can strive in this area. However, 10-ft. aisles have been reduced to 6-ft. aisles in hundreds of storage operations—a 40% space gain. Space savings depend on the height to which materials can be stacked. Hence, you may find that a relatively small investment in new equipment can effect major savings in storage costs. In preparing data, figure the cost of new equipment, less trade-in value of sale price of old equipment. Check the cost of refinishing floors and adding racks to make use of the gained space. Against these, balance the cost of building—or renting—space equivalent to that you saved by buying new equipment.

These formulas are practical—not blue-sky theory. But getting the data will require some digging. In some cases, you may find it necessary to make work sampling studies; in others, educated guesses will be enough. But exact measurement procedures have been worked out for each formula. These are fully detailed in Yale and Towne's *Management Guide to Productivity*. For a copy, write to Yale Materials Handling Division, The Yale and Towne Manufacturing Company, 11000 Roosevelt Blvd., Philadelphia 5.

TRAINING IN YOUR PLANT is economical for large crews. Suppliers can tailor the program to the precise needs of your servicemen or your supervisor-teachers.



TRAINING AT THE FACTORY offers experiences like use of the simulator above, plus damage-free and criticism-free trouble shooting in distraction-free atmosphere.

How to get ready for STATIC CONTROL

From now on, any automatically controlled equipment you buy will more than likely make use of static control. This applies whether the layout is as simple as a "go/not-go" photocell control or as complex as the equipment to control a strip mill.

Transistors, semiconductors, magnetic amplifiers, and other static devices are taking over from relays, tubes, and motor-operated timers because several years of experience have confirmed their initial promises. Not only are they replacing non-static devices in existing control, but they are also opening up complex processes to automatic control because their higher reliability makes it feasible to use the large numbers of components needed.

Static systems are making greatest inroads in automatic controls where life expectancy must be in millions of operating cycles for each component; where environment is hot, dirty, corrosive, or unstable; where the control must have lots of built-in "memory"; or where high operating speed is essential.

Unfortunately, there is no way to define precisely what is and what isn't a static control *system*. For practical purposes we'll deal only with systems that make use of at least several decision-making components; eliminating discussion of circuits that use only a handful of components.

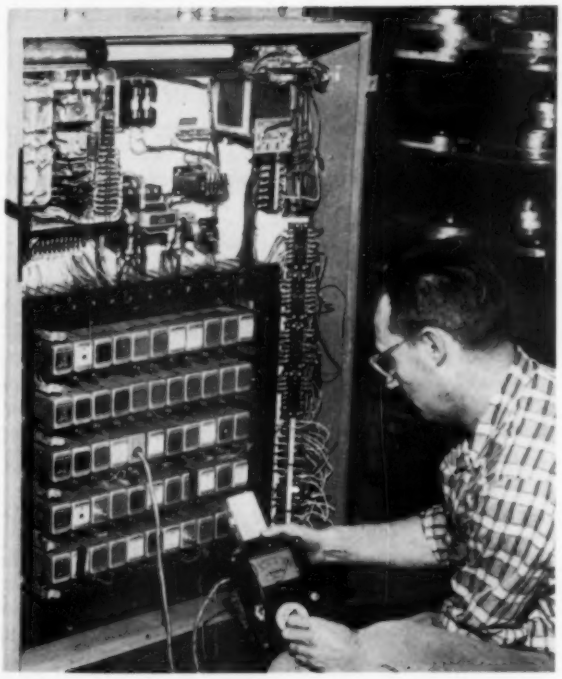
Up to now, most static control development has been limited to the decision-making portion of the control system. This is the part of the control that receives information from various sensing devices (limit switches, photocells, thermostats, and the like) and, when conditions are correct, produces an output to actuate the controlled device. Output levels from static decision-making circuits are still pretty much in the watt or milliwatt range. When kilowatt amounts of power have to be switched, it is generally necessary to use cheaper relay-type devices at the final stage of the system. For this reason, you might as well figure that your maintenance men will have to be good "relay" men as well as "static control" men for a long time ahead.

In planning static control maintenance and training programs, the job can be simplified by dividing static systems into two types, modular-packaged and chassis-packaged. Maintenance manpower, training, methods, and test instrumentation are different for each.

Modular-type controls as offered by the key manufacturers break up the control circuit into individual

By E. L. RUDISILL, General Purpose Control Dept. General Electric Company, Bloomington, Ill.

CHASSIS-PACKAGED equipment is serviced like a radio. Men need more skill, better test equipment. Only those specific parts that are faulty need to be replaced.



MODULE-PACKAGED control systems are serviced much like today's relay panels. Trouble shooting uses plug-in-type testers. If faulty, the entire module is replaced.

MAINTENANCE

packaged units, each performing a prescribed logic function. The system is assembled like a standard relay panel, using various combinations of logic elements to achieve the proper control sequences.

Chassis-type controls are assembled from static components, like semiconductors, conductors, capacitors, and magnetic amplifiers, in a suitable custom-built layout. The logic functions in the custom-built systems are usually difficult to visualize because the physical layout of the chassis seldom corresponds precisely to the sequence of the logic functions.

Generally speaking, modular-type equipment is serviced much like a relay panel; chassis-type controls are serviced like radios or TV sets. Modular designs are more expensive, but they generally are safer and much faster to check out, trouble shoot, and get back in service. And they withstand harmful environments better. Chassis-type construction lends itself to lower initial cost, easier replacement of individual components that fail, and easier circuit modifications. Because of the economics of control design it isn't feasible to design all types of automatic control using standard modular units. Thus, it's quite likely that even if you use modular controls widely, you should plan on your staff having to maintain some chassis-type units.

In isolating malfunctions in any type of static system, the maintenance man must be able to read a logic-type schematic diagram and be able to correlate a given machine function with the associated logic. Actually, any electrician uses this same procedure on standard relay panels. However, in relay panels there is usually a direct line of power that feeds from the pilot devices and eventually through the solenoid of the actual device. Static control devices are normally isolated from those in adjacent stages. So the electrician must learn to think in terms of signal transfer rather than power transfer. Because of this, he needs to understand the machine operating sequence more thoroughly than he would have to with a standard relay panel.

Malfunction isolation is done by following the signal transfer with the control system energized. One popular modular system provides a neon monitor light on each logic module. Another system provides a probe that lights a lamp on the panel when the probe is touched to a terminal having an output. On the other hand, maintenance of chassis-built controls generally calls for a vacuum-tube voltmeter or oscilloscope to check voltages against predetermined values that should exist under various conditions of operation.

Once the malfunction has been isolated, finding its

exact cause usually follows the same techniques used on relay systems. Continuity checking is most common. The electrician uses an ohmmeter with the panel de-energized, rather than checking with a trouble light with the panel energized.

There are two logic systems in use today—English logic, and redefinition or NOR logic. The former uses combinations of five basic logic units to handle any control function: AND, OR, NOT, MEMORY, DELAY. The redefinition system uses variations of one basic logic unit, the NOR. English logic equipment is easiest to understand (control diagram is almost a direct translation of machine process requirements). However, NOR systems normally use fewer components.

TRAINING DEPENDS ON SYSTEM

Our experience has been that almost any electrician who is capable of maintaining a relay-type control panel will be able to maintain a modular logic system that performs the same functions. But it is wishful thinking to expect that a "wire-puller" electrician will be able to maintain a static system when he would not be capable of maintaining the same panel if it were loaded with relays instead.

Any electrician—or even electronics technician, for that matter—will need additional training to familiarize himself properly with static equipment, theory of operation, drawing symbols and practices, new trouble-shooting and checkout procedures. Most of the key control manufacturers have faced up to the problem of educating customers' maintenance or supervisory personnel. Some of them provide a wealth of application manuals and maintenance and instruction literature. They offer factory training schools, portable display and experimental circuit simulation equipment, even maintenance schools taught at the customer plant.

MODULAR SYSTEM TRAINING IS FAST

Competent electricians will generally be able to learn how to do a creditable job of maintenance on modular systems with about 20 hours of class instruction and 20 hours of outside preparation. Modular-packaged logic systems require no written instructions and only the schematic diagram is required for an efficient diagnosis of any problems that might arise.

Once a group of electricians gets training experience, new additions to the force can be trained through the buddy system. New men can absorb knowledge gradually by becoming helpers, reading the literature, and asking questions.

The training of electricians to maintain a custom-built static system may be much more specialized. Usually, special preventive maintenance and trouble-shooting instructions will be prepared by the manufacturer for each specific piece of equipment. This cookbook approach to maintenance is easy for the electrician to follow, but it is often inefficient and requires a detailed book of maintenance for each piece of equipment. A topnotch technician handling complex chassis-constructed equipment needs to develop fast eye-scanning techniques, a thorough understanding of circuit theory, manual skills in instrument usage, and good memory and visualization abilities.

The inherent reliability of static control poses one new problem that has to enter into your planning. The failure rate on static systems is almost completely opposite to that of relay systems. With static control the majority of failures occur during the first 60 days of operation. A typical relay panel has a very low failure rate initially, but this increases as the panel is used. Months (sometimes years) may go by before a static control panel requires any attention except routine preventive maintenance. When a breakdown occurs, the electrician usually has to make a quick review to get on top of the situation. If you expect machine downtime costs to be high and maintenance competence low, 'round-the-clock availability of a manufacturer's service engineer might be an important consideration.

So if you have a large staff, don't plan to train everyone to handle static systems. One large automotive plant put some 60 electricians and foremen through two comprehensive courses in static control. Only eight men were actually needed. The men had so little contact with the system they eventually lost their touch. When they were needed, they had to be retrained.

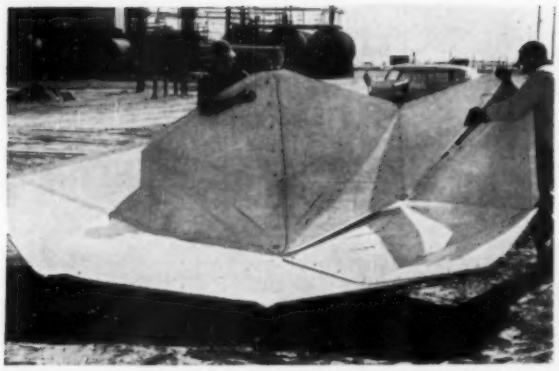
DON'T PASS UP TRAINING OFFERS

If you possibly can, take advantage of the control manufacturers' training courses for your maintenance staff. Men get many long-range benefits from a few days of concentrated study at the manufacturer's plant—individual instruction, an opportunity to trouble-shoot on actual units without fear of criticism or damaging equipment, and freedom from other responsibilities that might distract them. Despite management fears to the contrary, the great majority of electricians given special training have not only been capable, but extremely willing to put their best efforts to learning about even the most complex static systems.

Three alternatives to factory training are worth considering. The first is to send engineering, production, or maintenance supervisors to school, and let them set up your training courses. This permits you to schedule training as needed and when convenient. It also provides plant experts who can make functional changes in machine control. The second way is to arrange for manufacturers' training classes in your own plant. Where your staff is large, or undergoing change, this may be the most satisfactory. A third method, which is to rely entirely on the manufacturers' service staffs in your area, may be your best answer if you can't get the right men.

Trouble-shooting speed will also depend on the kind of instruments you provide for your staff. Some manufacturers of modular units offer plug-in testers that are much like in-circuit tube checkers. Fast chassis-type servicing calls for high-quality really portable instruments. With either type of system, it's a mistake to buy cheap test equipment or to rely on instruments for preventive maintenance that are so clumsy your technicians hate to use them.

Do-it-yourself utility shelter



FIRST, the overlapping flaps of five triangular panels are bolted together to form an umbrella-shaped crown assembly. Note ventilation flaps. The crown weighs only 15 pounds.

Fed up with tents and tarps for temporary storage? Then Monsanto Chemical Company (St. Louis) may have an ideal answer to your headaches in its new Geospace Shelter Dome, made by its subsidiary, Filtered Rosin Products Company (Baxley, Ga.).

First model to be produced is a 22-ft.-diameter dome, skin-supported. Prefabricated and pre-cut lightweight panels simply bolt together to form a self-supporting dome structure: there are no internal or external supports to the half-an-egg-shaped skin. It yields 350 square feet of usable floor space and 3000 cubic feet of storage volume.

The panels are machine-cut from ½-in.-thick Fomecor board; that's heavy-duty kraft paper stock laminated to both sides of rigid plastic foamed styrene. After cutting, each panel is dip-painted with a weather-resistant plastic-base coating for long service life.

Weighing less than 3 pounds per panel, a complete Geospace Dome can be assembled by a crew of two or three men in less than an eight-hour day. All parts, including an impregnated wood-base ring, are so carefully cut and drilled there's no lost time during assembly.

Costs? The 22-ft.-diameter dome sells for $345 in kit form, plus a $25 deposit for a telescopic erection mast welded from standard pipe. The kit includes window openings, a hinged entrance large enough to drive a jeep through, and hinged ventilation panels. The base ring is staked to the ground for lowest-cost construction; purchasers can add whatever refinement they wish in the line of flooring, larger door openings, plastic windows, illumination, or heat.

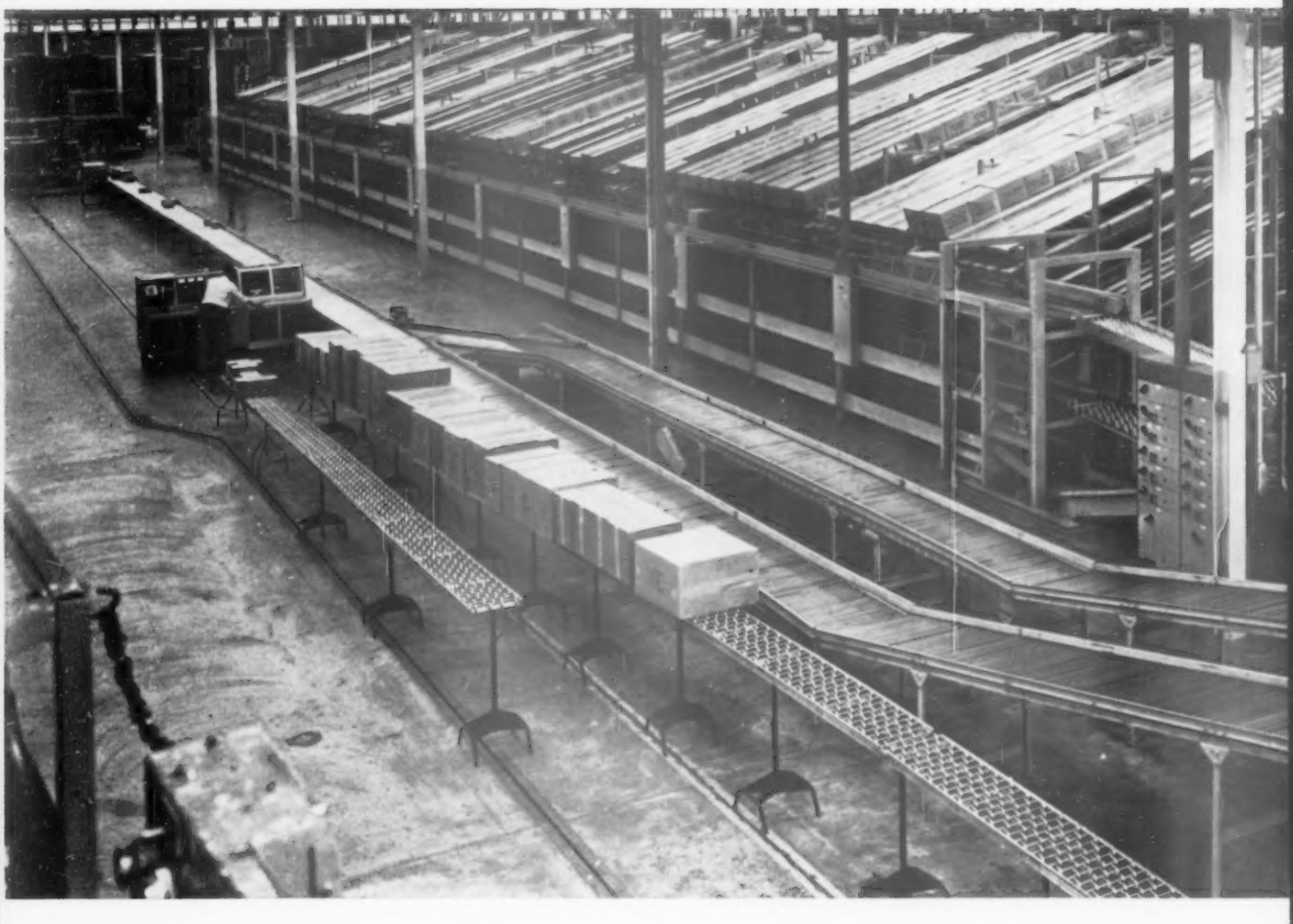
Industrial uses? Monsanto itself is already using two 22-footers at its new Bridgeport (N. J.) chemical plant site. One is for storage of pipe specialties and instruments as these are received from truckers; the second contains a large 3-D model of the new plant. Other customers are using the domes for job-site timekeepers' shacks and for emergency warehousing to supplement existing storage space.

Although a Shelter Dome will withstand high winds and driving rain when staked to the ground, it's light enough to be easily lifted and carried by several men to a nearby spot. Or, if desired, the dome can be quickly disassembled by removing the aluminum bolts from panel edges.

SECOND, the crown is set upright on the padded arms of a telescopic erection mast, and the next course of triangular panels is added. Calking is needed only at panel points.

THIRD, the remaining panels are bolted in place as the erection mast is gradually extended. Then the wooden-framed doors and wooden-base ring are added and mast is removed.

...this is



...Automatic Device for

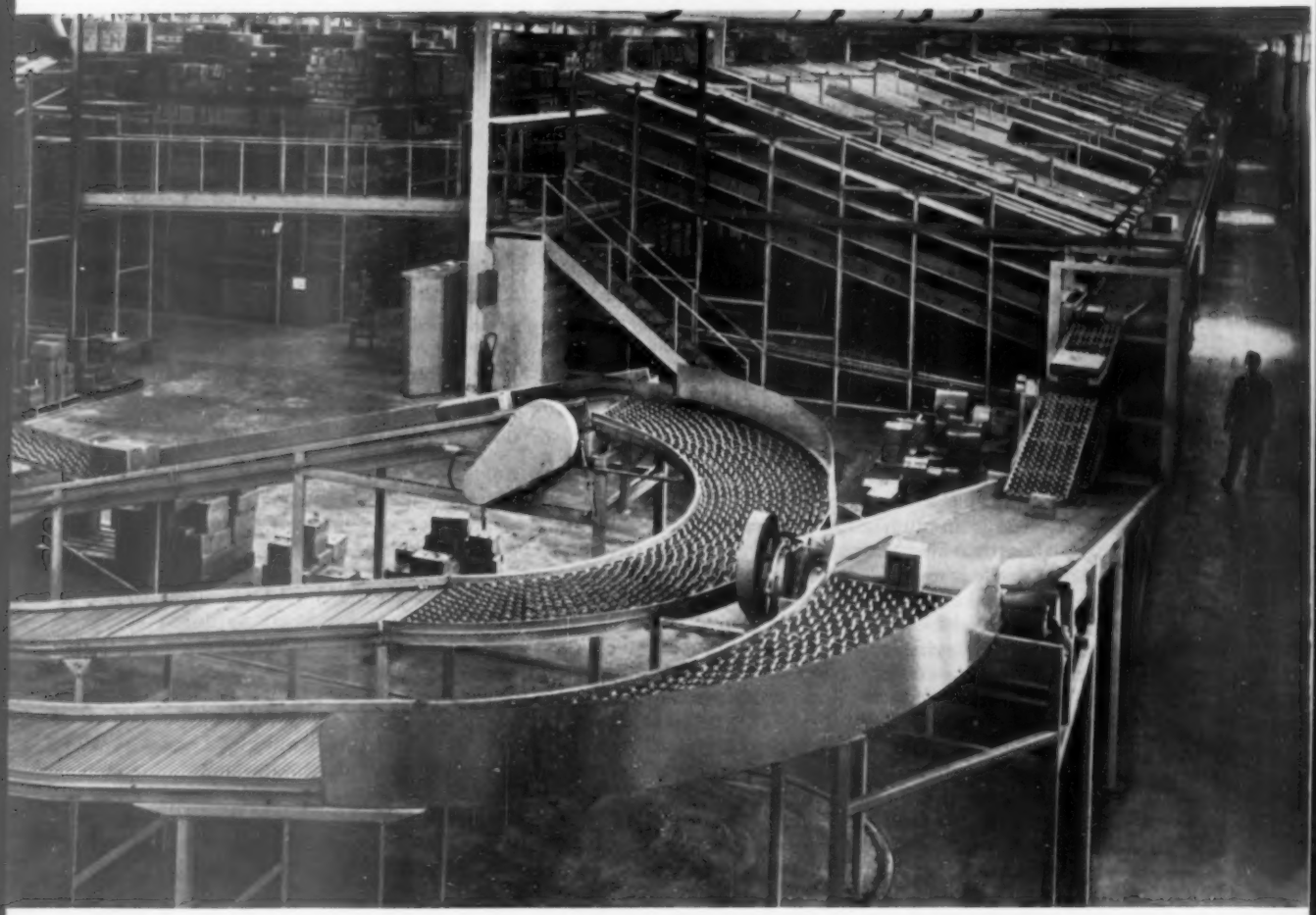
"THIS ISN'T A WAREHOUSE, it's a machine . . . with a building around it," says H. C. Blake, general manager of dynamic ADMOS, Inc. (Detroit), designers of the automatic order-picking installation shown here. It's not only a machine, but a darn good one; the pride and joy of Johnson and Johnson's big new warehouse just outside New Brunswick, N. J.

"ADMOS IV" checks product availability at point of selection, picks the number of cases of each item ordered, and counts them as it speeds them to the truck loading docks. Simultaneously, it records the action it took, and reports any shortages to the operator by closed-circuit TV. A central annunciator panel tells which lanes are running low—or are out of stock.

There are better than 650 items on ADMOS now, with plenty of room for expansion. It can handle 100 cases a minute, without breathing hard. (With small orders, of course, belt-clearing time slows it up.) It's already putting out well over the volume J&J expected to be handling in 1964. It selects over 60% of all the goods that leave the shipping center. (Another 30% are full-pallet shipments, and the rest consists of broken-case quantities, special promotion deals, etc.)

Errors were practically eliminated, in spite of a

ADMOS



Mechanized Order Selection

tremendous increase in the volume of goods shipped. This means better customer service; which, after all, is the purpose of a distribution center. Fewer people are needed, and it's quite likely that the space savings alone (30,000 square feet) at J&J could pay for the whole thing, although they weren't even taken into account in the proposal. Flexibility and very low maintenance are designed into ADMOS. Size and number of lanes can be changed without tools. Simple, rugged, plug-in components and modular construction are used. And it's electromechanical, not electronic.

Picking orders at J&J was hardly primitive to begin with. The last word in draglines was installed when this warehouse was built. But errors were too common, the system couldn't be expanded, and it was too slow; Like a tube—once in, you had to go all the way through.

The cost of scrapping the dragline had to be considered during the systems analysis and planning that went into this job. (Each ADMOS—this is No. 4—is unique; designed for a specific installation.) According to J&J, the ADMOS bid was by far the lowest received. And it would be hard to find a tastier capital investment; it offers over a 25% return.

For more details on the system, turn the page.

Operator starts machine for each order. Items are automatically

CONTROL CONSOLE is equipped with two-way radio. Counters show number of cases picked, TV signals shortages. Items can be manually selected by keyboard. Operator controls the . . .

. . . **card reader.** Shortages are printed out as they occur, televised to console. Cards set up electrical impulses that trigger . . .

Low cost of the ADMOS system was one of its big attractions, of course, but far from the most important. Johnson and Johnson is an old hand at pioneering, and is plenty savvy about machine design (the only way to get Band-aid machinery is to build it). So it takes more than a gimmick to make an impression. Among the things that impressed J&J were the simplicity of ADMOS; the low-cost, reliable release mechanisms; the comprehensive systems analysis that was made; and the fact that known, dependable components were used —no razzle-dazzle.

The basic idea behind ADMOS is fairly simple. Goods are loaded end-to-end in inclined chutes, or lanes (2000 of them in this case). At the base of each lane, a release device holds the goods in place until it's tripped by an electric pulse, which frees the lowest case. The released case drops to a moving belt and is whisked away at 450 feet per minute. As it approaches the loading area, the case is slowed to 75 feet per minute by live roller conveyors. Electric eyes count the cases as they come off the belt. They're checked and stenciled on the move, then sent directly into a truck. Two men can load a 35-ft. trailer (some 900 cases) in half an hour.

J&J uses punched cards to activate its system, but paper or magnetic tapes would do just as well. The cards are prepared by a computer, which predetermines the cube volume and weight of the orders and breaks them down by truckload. The card reader is controlled from the ADMOS console in the warehouse. The console operator can also pick items manually with a keyboard, use of which automatically cuts out the reader.

When an item is out of stock, the reader prints out the information, and it shows up on the TV screen at the control console. The operator can then either get on his two-way radio and order the lane refilled, or adjust the bill of lading and enter a back order. At a separate annunciator panel, a series of lights show which lanes are low on stock and which ones are empty.

The conveyor system has been kept simple. Conventional rollers and disks have been used wherever possible, and guards have been kept to a minimum. For instance, at one point, the cases come howling into a 180-deg. curve; but proper banking of the rollers (which conveyor manufacturers said couldn't be done) keeps the cases under control. In two places, cases from three belts are being merged at high speed with no gates, electric eyes, or other ornaments. The cases are slowed for easier handling by simply putting a friction bearing after each three rollers. Tracks from the old dragline were pressed into service to bear the movable mechanized bridge that shunts the cases into the right truck. From the bridge, an extendable conveyor can be poked 40 feet into a trailer and backed off as the trailer fills up. If any conveyor fouls up, the reader stops—to prevent a log-jam.

Blake's passion for simplicity also shows up in the design of the lanes and the release mechanisms on ADMOS. In the case of the release, the ADMOS design uses the solenoid as its own frame, instead of mounting it on a separate piece. The solenoid also starts with a little free travel when it's fired. It's much easier to maintain and more reliable than other devices. It's a plug-in unit, and because of its curved race, it acts as a lock until it's fired. Variable tension protects cases, and ingenious features prevent dumping the whole lane, no matter how heavy the item. All this, mind you, when other releases cost five times as much.

Same thing with the lanes. Instead of using rollers (except on a few special items), ADMOS, Inc., came up with simple coal chutes that cost about 35¢ a linear foot. Rollers run 10 or 20 times that, cost something to maintain, are much more expensive to install. Quick flexibility is another bonus with the chutes. They're made of sheet metal, about 27 feet long, and come in

elected from any of 2000 locations, conveyed directly into carriers.

. . . **release mechanisms.** When a release is tripped, the end case slides onto the moving belt in the foreground. Type of release used depends on the product handled. Cases are rushed to the . . .

. . . **mechanized bridge.** Powered belt conveyor is collapsed in sections as loading progresses. Bridge rides on old dragline tracks, can be spotted to serve any of 10 loading docks.

six widths (from 6 to 30 inches). They just clip on to the main frame. If you decide, for example, to change a unit from two 18-in. lanes to three 12-in. lanes, all you have to do is unplug the limit (stockout) switches, pull out the old chutes, and slip the new ones into place. No tools, no troubles, and very little time.

The chutes also save a lot of floor space. At J&J, there are five elevations, each lane inclined less than 20 degrees instead of the usual 30 to 35 degrees. How come the first cases don't get smashed when a lane is being loaded? Two reasons: The last case in a lane is never picked, so there's always a cushion; and a very crafty (again simple) device slows the descent. The cases ride on a pair of removable plastic runners, rather than directly on the chute. The coefficient of friction on these runners can be varied along their lengths. Staggering the "rough spots" along the runners causes the case to be cocked first this way, then that, against the sides of the chute, slowing it down.

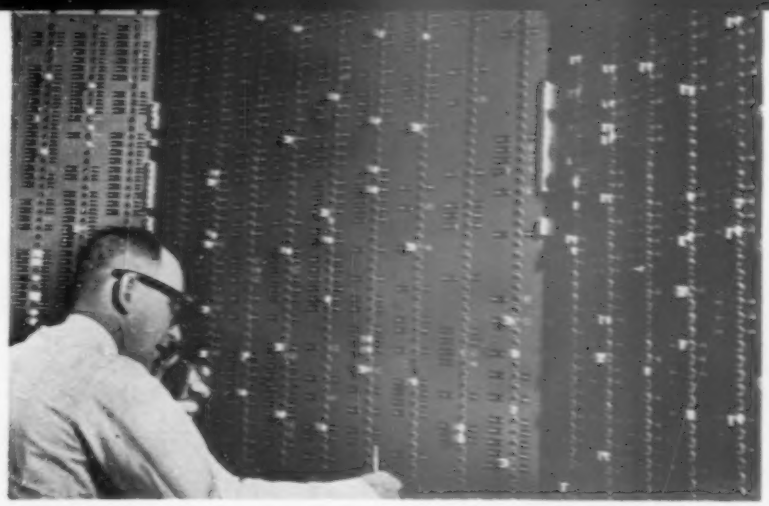
Simplicity and economy are reflected even in the main structure of ADMOS. The framework is modular, and boasts a "keyhole" assembly that makes erection and expansion a lead-pipe cinch. Four men, armed with a lift truck, put up a 200-ft. section in just two days. Each of the 50 bays came pre-wired as a harness, and the limit switches were popped into place by hand.

Flexibility and ease of maintenance are designed into all the electrical features. Each lane is essentially its own circuit. If one lane malfunctions, you simply "jump" it out, and the machine will automatically start picking from another lane carrying the same item. Electrical trouble shooting can be done by feeding a special deck of cards through ADMOS—it quickly checks itself for shorts, grounds, open circuits, etc. Each junction box serves two bays in tandem, and every box is exactly alike. A man working at one of the boxes can see every change in mechanical performance caused by his changes in the wiring. Changes can be made by hand, since the connections are all plug-in units, like an IBM panel's. Each junction box cover carries the circuit diagram. Main control and switchgear are centralized, and the entire machine can be maintained by a man with only basic electrical skills.

Like the actual truck loading, replenishing the lanes is done manually. Two men are now replenishing on each shift, but better organization of the items is expected to reduce wasted motion enough so that one man can handle the job. The lanes hold over a week's supply of about 85% of the items, and another 7% have to be filled only twice a week. Each lane has two foolproof limit switches—"reload" and "lane empty"—connected to a central stock control panel. Radio-dispatched lift trucks feed stock into storage racks just behind the lanes, so the replenishers have a convenient supply to work with.

The warehouse kept right on working during the installation of the new system, but the changeover was rough. For one thing, the switch in paperwork threw off the dragline set-up. And the men were naturally edgy. Errors went up for a while. There were breakdowns in replenishing, faulty cases caused jams, and at first the best release wasn't being used with every item. Fortunately, once the mechanical problems are resolved, they don't come back. But they do extend beyond the walls of the warehouse. For example, J&J had to improve its case-sealing equipment, and sell the idea of much more uniformity in packaging. Electrical problems were confined almost entirely to the modified tabulator that was reading the cards (it's being replaced). "ADMOS itself is an electrician's dream," according to a J&J engineer.

Most of the trouble can be blamed on two factors that couldn't be controlled at the warehouse. First, the system was put in at a bad time and put to use



CENTRAL STOCK CONTROL PANEL. Banks of lights signal which lanes are low on stock or empty. Panel is checked periodically. Dispatcher radios lift-truck operators for more stock. An intercom is used to communicate with the . . .

. . . replenisher, who restocks the lanes from pallet-load supplies on the racks behind him. Two men restock each shift.

immediately. As luck would have it, volume set new records during this period. A sales contest hit right in the middle of it, and several new products went over like ten-dollar mink. The heavy volume that resulted from all this really complicated the necessary debugging and retraining.

The other difficulty was that J&J was really breaking new ground. Machinery was being put in where it had never been before. However old-hat it may be in a plant, installing a major machine is a completely new experience to warehousemen. At J&J, it took a while to reorient the warehouse staff. Sales, of course, objected to temporary mix-ups, and accounting wanted quick payback. They expected the new system to give instant results, like a vending machine. Everyone knew the system should have been debugged before it was used for output, but service to customers won't wait. You can't build up an inventory of orders in a warehouse the way you can in a plant. When an order comes in, it has to go out, period. So ADMOS was in harness before it was tamed.

In spite of a few growing pains, the system is now doing fine. J&J's target volume was 14,000 cases a day by 1964. ADMOS is regularly picking far more than that right now. Maintenance has been negligible. Besides space savings and fewer errors, customer service is much better. Load times are more predictable, and it's easier to schedule trucks. There's a fringe benefit here, too; the outside carrier is now in on the final count, and signs the bill of lading. Before, with 10 dragline teams working, 10 checkers would have been needed. But ADMOS pulls only one order at a time, so the carriers can do their own checking.

The new system provides better control and involves much less walking than the dragline set-up. And it's far more flexible—and expandable. Before, the bays were fixed by the dragline. When a new product came in (if there was room for it), the other items had to play musical chairs. There was no way to expand. But ADMOS can handle J&J's planned expansion through 1965. It also makes product loading in the truck possible for the first time.

Fewer people will be needed with the new system. So far, because of abnormally high volume, debugging, training, and so on, J&J hasn't been able to cut back much. But about half as many men should be able to do the job ultimately. This will also mean fewer—but higher caliber—supervisors. They'll have to know scheduling and maintenance; be concerned with machine utilization, instead of acting like KP pushers.

JUNCTION BOX. Each box controls the two bays that flank it. Simple plug-in connections can be changed by hand while watching effect on releases.

CONSTRUCTION DETAILS. These show modular "keyhole" assembly of framework, plug-in limit switches, and how product chutes clip on to framework. Each bay is pre-wired as a harness to facilitate changes.

"Now we do it FASTER BETTER CHEAPER"

Costs, costs, costs. Everyone faces them, and they're usually rising. Allowed to climb unchecked, they can (and often do) price a company right out of business.

More and more, an eye for cost reduction is becoming a required part of every manufacturing man's ability. But the only CR effort that can be counted on for more than a token return is the relentless, continuing program that questions *all* operations—large or small.

Such a CR program at the Small Aircraft Engine Department of General Electric Company (Lynn, Mass.) resulted in a 20% drop *in one year* of the T58 turboshaft engine powering military helicopters, with a bonus of increased engine performance.

The photos at right show how one basic operation in the production of jet engine stator assemblies was completely eliminated. In its place was substituted a faster, more effective, mechanized operation.

Stator vanes for the turbojet engine were formerly fitted into holes cut into the ring segment, then brazed (top photo). But cutting and fitting were difficult, time-consuming, hard to control. Cost reduction and methods improvement teams did away with this altogether by a process called "stabbing." Now the vanes (which have a higher hardness number than the ring) are simply pushed —or stabbed—through the double wall of the retaining ring segment prior to brazing.

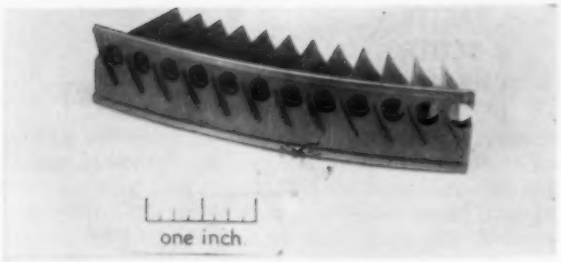
Hand method was tried first (second photo); it used a standard hydraulic cylinder to stab vanes into the segment. The set-up was designed and built in the shop. But the process proved so effective the home-built unit couldn't give the desired quantity.

Specialty machine (third photo) was purchased to handle the vane stabbing. Vanes are stacked in a magazine, hydraulically positioned, and pushed through the two thicknesses of the retaining ring segment.

Numerical control of index table (bottom photo) may be done from punched tape, manual dials, or job button. The machine also clamps and positions both vanes and ring segments automatically.

Turn the page

By JOHN H. NELSON
Supervisor of Cost Estimating
Small Aircraft Engine Department
General Electric Company, Lynn, Mass.



STATOR VANES that fit into stator ring segments used to require a slow, tedious process of cutting and fitting.

HAND METHOD of "stabbing" boosted production, gave higher quality assemblies even though equipment was home-built.

SPECIALTY MACHINE feeds vanes from a magazine, "stabs" them into a number of ring segments as the table rotates.

NUMERICAL CONTROL (via paper tape) runs the machine. New method cuts costs, boosts production, improves quality.

". . . FASTER BETTER CHEAPER"

A second basic operation that fell under the scrutiny of cost-conscious plant men was the method of making gas turbine compressor blades and vanes. Small size and unusual blade design were pushing manufacturing costs upward. The blades have an exceptionally high ratio of air-foil thickness compared with platform width. The smallest blade is little more than a ½ inch wide, while thickness at the trailing edge is only 0.006 inch. Attempts had been made to produce the blades by such conventional processes as forging and rolling, but these methods proved either impractical or expensive. After that, the blades were manufactured by machining from bar stock.

A new method of "roll and coin" now produces the blades at 50% of the former cost. Cold metal is progressively worked toward final shape in a set of roll dies. Final steps include coining, annealing, and tumbling. Results: over $1000 per engine saved.

Spectacular as they are, these savings aren't the real backbone of our CR program. The reason: big, dramatic savings—welcome as they are—just don't turn up every day. It's the little items—the nickel and dime economies you can find all over a plant—that add up to really big savings. These come from a concentrated attack by all levels of management. At General Electric we use the following to slash costs: company task forces to study all aspects of product costs; increasing use of automation in purchasing, manufacturing, and accounting; help to subcontractors and suppliers in making similar cost reductions; increased placement of contracts with small business; employee suggestions; and techniques of value analysis. Such a company-wide program aimed at military products alone has saved U. S. taxpayers some $130,000,000 over the past three years.

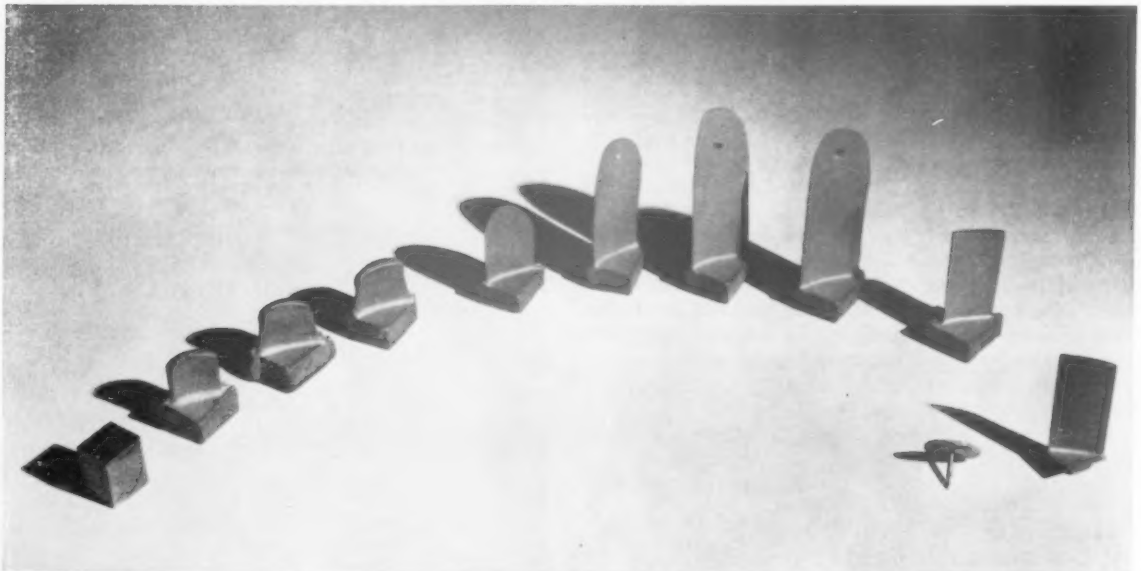
Here is a handful of ideas that have helped us whittle down costs in the SAE Department:

- Changing a rear bearing cap from a forged and machined piece to an investment casting reduced the unit cost from $4.70 to $1.70 each. As somewhat larger production quantities are needed, costs will be reduced to $0.25 each, by the use of powdered metal.

- By standardizing on nut and bolt sizes in one of our engines we are saving $60 per unit. While this substituting of standard for special fittings is a common practice, an alert CR man can sometimes do just the opposite and save even more. In one case, we went to a specialty vendor who was already selling large quantities of an inexpensive substitute for a standard AN fitting. Our order was bonus business for him, and our part price was cut from $1.42 to $0.68.

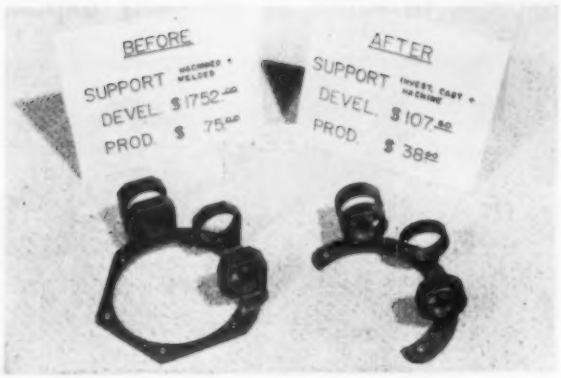
- The dollies on which engines are assembled were redesigned to allow for vertical, rather than horizontal assembly. Cost savings come from three factors: dollies are only one third the size of those formerly used, fixturing has been simplified, and there is optimum alignment of engine parts. Bonus: Vertical assembly increases floor space by 66%.

- Plastic seal caps (the kind used on lawn furniture legs, etc.) are used for protecting openings on fuel lines and other connections during engine assembly and shipment. These caps cost only two cents each; the cap plug formerly used cost 20 cents.

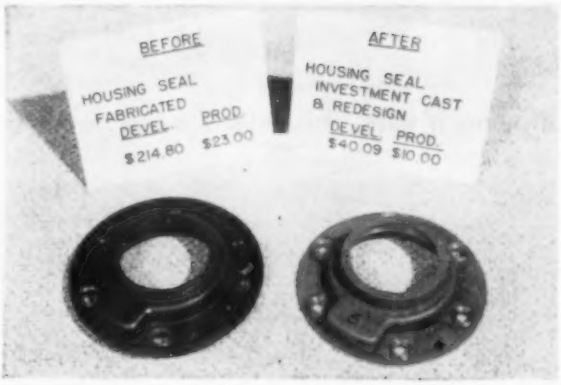


COMPRESSOR BLADES and vanes for gas turbine engines are progressively worked in a set of roll dies and then coined into final shape. Unusual blade design and small size made machining expensive. Carpet tack (right) shows size.

The bearing support shown here was a difficult fabrication, which in development quantities required many hours of fussy fixturing, welding, and machining. By changing to an investment casting, the fixturing and welding were eliminated, leaving only the machining to finish the component. Development lot prices dropped from $1,752 each to $107.60 each. Production prices went from $75 each to $38.60 each.



A complicated welded housing seal fabrication was simplified by a change in design to accommodate the investment casting process. This not only resulted in a less expensive component, but did away with the potential leaks and stress concentrations resulting from excessive welded areas. Cost reductions were $174 each in development quantities, and $13 each in production quantities.



On this bearing and gear assembly, machined spacers were costing $3 per set. Quantity production and satisfactory mechanical strength allowed us to consider powdered metallurgy for these spacers. After consulting with a specialty supplier, powdered metal spacers were adopted. This resulted in a cost reduction of $2.95 per set, a 98% drop.

After a value study, a huge reduction in shipping expense was realized on a new type of shipping can for small component parts. These were being used at a rate of about ¼-million containers per year. The old method was to pack in a slip cover can, and to tape the cover. The new method employs a fruit juice can, and an inexpensive mechanical sealer. Cost of packing dropped from 20 cents each to 5 cents each, and the taping bill of $11,000 per year was eliminated. Total annual cost reduction: $45,000.

Sleight of hand at company expense—these six tactics are favorites of th

Playing it safe, this fellow never rocks the boat.

Backbiting is . . .

Swordsmanship with a pen can eliminate competition.

Lining up a team . . .

Stealing the limelight attracts unwarranted attention.

The freeze-out . . .

lant schemers.

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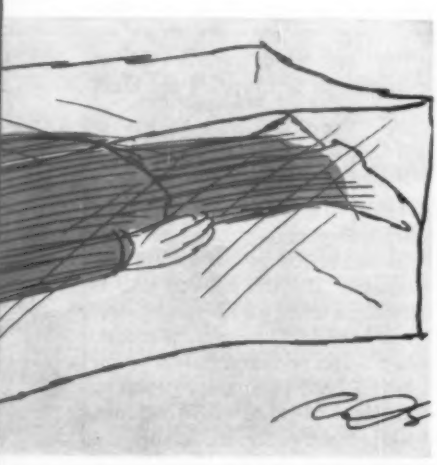


means oblivion for this victim.

POLITICKING in the PLANT

You can't just ignore the presence of petty politics in a plant. All along the line, it can undercut morale and drive down production.

POLITICS is all around us. Radio, TV, newspapers, and magazines are loaded with it. But when petty politics gets into a plant, it's a real menace. It shows up in a lot of expensive ways. It's a game for high stakes. Both the men that play it and the ones affected by it often come out losers. The company *always* loses. The reason: Plant politicians are less concerned with company goals than with winning personal power.

How do you cope with a plant politico? Fighting fire with fire makes you as guilty as he is. But you can't just sit back and take it, either. Where do you draw the line?

There aren't any neat, ethical solutions to political problems. The issue gets clouded by your own divided loyalties, ambition, fear—and by expediency. But there is a middle ground, based on balancing ethical and practical considerations.

Of course, compromise, concessions, and strategy are all normal facts of life in a plant. And everything that's labeled "politics" is *necessary* at times. The danger lies in courting the idea that success and integrity are mutually exclusive; and that only the man with a knife leaves his mark.

A campaigner for the White House is easy to spot. Buttons and banners make it obvious that he's on the campaign trail. But the plant politico has to stay under cover. If he tips his hand, he could find himself out in the street.

The shape and form of political maneuvering varies with the politician's personality, the situation he's in, and the odds he faces. **But most of them fall into the six categories listed on the following two pages.**

By JOSEPH D. ARDLEIGH, Executive Vice President, Research Institute of America, Inc.

Playing it safe assures the plant politico he will always avoid controversy

Conservative thinking is normally a healthy safeguard. But when it becomes a political weapon, it can be fatal. Some men never commit themselves to *anything* until they are sure which way the wind is blowing. Each knows that if he can muster enough reasons not to "rock the boat," he stands a good chance of keeping his job—if his company weathers the storm. Any failures can be blamed on the radicals.

Besides, if he approves major changes, he knows he'll have to put them into effect. He'd rather duck this responsibility, even if it means deliberately hobbling the company.

Drawing the line between discretion and stagnation is a matter of judgment. Don't confuse the honestly conservative executive with the smooth operator who straddles every fence just for self-protection. If you find that a man lacks the courage to move forward, remove him.

Backbiting is a sly but vicious weapon in the schemer's ugly arsenal

The advanced plant politician spends his energies narrowing the field of competition. He gets results in many ways, ranging from simply planting "information" in the right places, to outright tampering with facts. His weapons: gossip, rumor, innuendo. Often he camouflages his venom with light humor.

The assistant manager of one factory in a multi-plant corporation is a typical example. He is inclined to tell what he calls "amusing little stories" about his colleagues. And he usually trots out these treasures when chatting with someone from the main office. His stories seem to flow naturally enough from the topic of conversation, but the laugh is always thin, the edge always cuts.

Many a deep wound has also been inflicted by a skillful handling of faint praise. Simple comments can do the trick. For instance: "He's a terrific guy once you get used to his idiosyncrasies" or "Tom has top qualifications. Why, once he gets his family troubles straightened out . . ."

The backbiter can be stopped cold once you recognize his technique. The most effective way to block him is to deprive him of his audience. If the campaign is directed *to* you, make it clear that you won't tolerate tale-bearing—even if you have to miss useful information occasionally. (Backbiters usually peddle *mis*information. The subordinate who latches on to the boss's ear usually handpicks the information he passes along and rarely wastes an opportunity to shore up his own self-interest.)

If the campaign is directed *at* you—if you find yourself the intended victim of a shoddy maneuver—call it! But give the politician a chance to back down before you expose him to others. If the digs persist, alert the boss to what's going on. The politician will hang himself with his next attack.

Swordsmanship with a pen builds incriminating memos—for the other guy

The art of the memo is an effective political tactic—especially in companies with a widespread, multi-plant operation. Crafty memos can be carefully worded so they'll be interpreted as "calling the shots" if the project is successful; or, with equal skillfulness, as having foreseen weaknesses if the project finally falls through.

The "attention-getter" memo is good, too. Carbon copies are its prime *purpose*—not its by-product. In fact, sometimes the "original" is not even sent out. But the right name after "To:" will assure that every carbon copy will be read.

A politically adept subordinate may cover himself by writing a report for the record when he thinks you are treading on dangerous ground. Without risking a face-to-face showdown, he can minimize his danger by a careful statement to "file"—with carbons addressed to the proper parties.

Generally speaking, the only defense necessary against the memo-writing politician is to be on to his tactics. The danger is that his attempts won't be recognized for what they are. Once revealed in his true colors, this campaigner is deprived of the chief weapon in his little arsenal.

Lining up a team is a widely practiced tactic, but it sometimes backfires

Football coaches and political campaign managers are past masters at the technique of scouting and lining up a team. But they have nothing on some plant politicians. One of the symptoms of an advanced case of plant politics is an excessive concern with balance of strength. A skillful politician carefully musters strength in his own camp. In the process, he often plants the seeds of his own doom. The "right amount" of strength sometimes proves to be too much, and one of his allies grabs control.

In lining up colleagues to support an idea or a pet project, the plant politico goes after the men with the most weight. He does exactly the reverse when lining up his own department. Every manager wants a loyal team, and generally is interested in expanding the number of his subordinates. But the politico guards against stocking his department with ambitious, well-qualified assistants. He sees them as a threat.

The consequences of a recent merger show what can happen: Managers of both companies began to throw roadblocks in the way of promising assistants. They played one off against the other, made sure the smallest errors were magnified for the attention of higher-ups, sidetracked productivity by involving sub-

ordinates in duplicate projects, even recommended for transfer men sharp enough to become a threat.

Fortunately, this civil war was nipped in the bud as soon as the company president heard about it. He called a meeting of the vice presidents and demanded a stop to the scrambling and jockeying. He made it clear that their failure to develop competent people would be a heavy demerit on their own rating.

Stealing the limelight is a debatable practice among shrewd plant politicians

Plant politicians consider meetings either a golden opportunity or a booby trap. Many a young executive on the make dreams of rising at the conference table and stunning the entire board with his brilliant exposure of the weaknesses in a project.

Most plant politicians disagree with this. They're cautious about going out on a limb in the presence of superiors. They make it a rule not to offend—or even risk offending—the top brass.

When asked what he would do if he were misquoted and his point of view misrepresented by his boss in a meeting, one man said:

"I'd fight, but I'd use my head. What would I gain by showing up my boss in front of his superiors? What *I'd* do would be to circulate a copy of my original report to everyone who was at the meeting. I'd make no reference to the misquotation. I'd simply attach a covering memo saying 'I thought you might be interested in seeing a copy of my original report.' That should do it."

Unfortunately, this attitude is encouraged by many companies. Only a Don Quixote would dare to defend his convictions if candor has never paid off in the organization. Smooth meetings may well indicate a general feeling that contrary opinions—even contrary facts—aren't welcome.

This type of excess coyness can be minimized. Whenever a manager calls a meeting it should be because he really wants to hear new ideas. Nothing will stifle free and open exchange more quickly than phony meetings, called to "discuss" problems after the solutions have been decided upon.

The freeze-out skillfully blocks a competitor, makes him feel forgotten

Among higher-level managers, there is usually less political maneuvering. It also takes on different forms. For one thing, higher management has direct access to the top men. For another, the ranks at this level have already been thinned. At lower levels, for instance, a freeze-out is simple: You just by-pass the victim. At upper levels, subtler ways have been developed for elbowing a man out of the way.

Most of these upper-level stratagems aim to frustrate a manager so he'll drop out of the race. Here are a few common gimmicks:

. . . "Forgetting" to notify the victim of meetings.
. . . Undercutting his responsibilities and prestige.
. . . Reassigning him to an unsuitable job.
. . . Keeping him on the road, away from the office.
. . . Neglecting to answer his memos or phone calls.

Organization and ethics are the keys to ridding your plant of petty politics

The organization governs whether plant politics flourishes or never gets going. Political trouble goes hand in hand with organizational trouble. It feeds on such factors as these:

- Indefinite lines of responsibilities.
- Uncertain criteria for advancement.
- Faulty communications.
- Overemphasis on group decision-making.
- Inter-departmental competition.

An excellent example occurred recently in a large New England textile mill. Top management had not clearly defined responsibility for market research. Result? Sales, production, and head office people competed; each group withheld valuable data from the others. Until the decision was made to set up a special group, market research was a costly political football.

Manager's ethics call for careful scrutiny, too. After interviews and conversations with managers in many areas, the Research Institute of America formulated its Executive Code—a general guide for men who must cope with internal political problems.

1. Personal values. Everyone must decide for himself which beliefs he can compromise on and which are firm convictions. Those he considers essential to his own integrity must *never* be sacrificed.

2. Dignity. His position of leadership prevents a manager from taking part in any strategy that is beneath him. By refusing to stoop to cheap practices, he builds prestige, which is tough armor to pierce.

3. Respect. A manager with principles of his own must remember to respect the convictions of others.

4. Self-sufficiency. A manager needs confidence that his own efforts and ability are more important to the business than any force created by a "clique."

5. Impartiality. The manager that forms too close a tie with subordinates is brewing trouble. He must avoid favoritism, keep his private life to himself, and never accept favors from his people.

6. Positive criteria for achievement. The worst competitor is the one who wants to keep others from taking the lead. This benefits nobody. A manager must press ahead in a positive way. Nothing is more basic to leadership than having independent goals.

7. Realistic outlook. This simply means remembering that "business is business." Without rejecting personal convictions, he has to be practical, concentrate on what's possible.

In business and industry politics is misplaced—and costly. Maybe it can't be stamped out entirely, but it can, and must, be brought under tight control.

LOOK WHAT'S HAPPENING TO

Within the last year or two welding technology has taken some big jumps forward. Many one-of-a-kind welds that have been done manually for a generation can suddenly be handled semi-automatically with a payoff in three or four months.

How long is it since you studied whether the welding methods you use in production or maintenance are really up-to-date? If you haven't done so within the last year or two you may be in for some real surprises. There may have been some justification for the complaint that the welding industry was coasting during most of the fifties, but it's unquestionably back in high gear today.

This year's annual American Welding Society meeting in New York, and the welding show that accompanied it, provided plenty of evidence that big changes are taking place in welding methods. Some of these new techniques double or triple welding metal deposit rates, increase precision, upgrade quality, and in some cases eliminate entirely the need for skilled operators. Many of the methods were not possible five years ago, and not commercially available even a year ago.

Semi-automatic fusion welding is certainly one of the most important new developments. The manual arc welding methods that have dominated assembly and maintenance welding since the late 1930s are going to be squeezed by several new semi-automatic and automatic welding processes. Among the newest and most versatile are those in which the electrode is fed from a reel several feet away through the operator's hand gun. The operator places the gun tip against the work and simply squeezes the trigger to start welding. Far less skill is required—an electronic control circuit varies the feed rate of the electrode to keep the gap across the arc correct. The operator has only to move gun along the weld path. At the show, Air Reduction Sales Company (New York) and Hobart Brothers Company (Troy, Ohio) demonstrated new semi-automatic equipment using inert gas (argon, helium, or CO_2) to shield the arc. Westinghouse Electric Corporation (Pittsburgh) showed a similar system for tack or arc-spot welding in which the current and electrode drive is timed for a 1-to-4 seconds cycle, then is shut off until operator moves the gun and squeezes the trigger again. With this technique you can fuse two pieces of plate together with access to only one side of the top plate.

Improved electronic controls and semiconductors are showing up in almost every type of welding equipment. Multiple-head oxyacetylene cutting machines use photocells to follow an ink-on-paper master tracing (National Cylinder Gas, Chicago). American Messer Corporation showed a German unit that can flame-cut duplicate shapes from heavy plate on the shop floor while the curve-tracer head scans the master drawing in the office.

Resistance welding equipment is showing continued gains. A new magnetic force unit welds sheet steel even though it's coated with vinyl (Precision Welder & Flexopres Corporation, Cincinnati). A new static control for resistance welders uses all solid state devices to control squeeze and weld timing and duration (Square D Company, Milwaukee). Several control makers displayed newly transistorized versions of resistance welder controls.

Even gas welding is turning up its share of improvements. Several suppliers are promoting the use of liquid oxygen in king-size tanks that cuts tank-handling to a fraction and may eventually bring about cheaper bulk handling of oxygen for welding in medium-sized plants. An interesting new technique uses an oxyacetylene torch modified to spray powdered hard surfacing or other alloys. The powder is transferred by a stream of inert gas fed into the rear of the torch nozzle. A pushbutton switch on the torch opens the valve and energizes the vibrator, which feeds the powder into the gas stream. Powder (with flux added) passes through the flame and deposits on work surface. (Air Reduction Sales Company)

Auxiliary equipment has become far more versatile. For example, sheet-metal weld inspection is speeded with a new ultrasonic flaw-searching probe that is mounted inside a small rubber tire. As the tire rolls across a sheet of metal guided by a track suspension, the probe shows the existence of any flaws nearby on the oscilloscope screen. In automatic operation, any flaw will trigger an alarm. (Sperry Products Company, Danbury, Conn.)

There were plenty of other trends in evidence—more rugged precision equipment for positioning or rotating weldments during automatic welding or surfacing, lower prices on some equipment, a few new types of good quality imported equipment, greater use of constant-voltage welding power sources, and quite a few mostly-in-the-future processes like electron beam welding.

WELDING

1. PLASMA ARC SURFACING

It's a new heat source that fuses refractory alloys into metal surfaces under remarkably close control of both depth and penetration. Intense heat comes from ionization of the argon stream within the torch and the arc between torch and work. The argon also carries the powdered surfacing alloy. Several manufacturers expect to offer plasma sources for actual welding shortly. *(Linde Company, New York)*

2. FRICTION WELDING

It's brand new. Fuses tubing or bar stock by rotating ends together under carefully programed cycle of speed and varying pressures. Makes high-strength fusion welds in wide range of metal combinations—e.g., aluminum to steel (even metals to plastics). Adapts easily to automatic operation. Requires only a fraction of the power normally used in flash welding methods. *(American Machine and Foundry Company, Springdale, Conn.)*.

3. ULTRASONIC WELDING

It's moving into fabrication of heavier material. This 4-kw. model is being used for experimental work on aluminum sheets and plates. Transducer that converts power into vibration is in compartment above upper ram. *(Aluminum Company of America, Pittsburgh)*

4. "STUFFED" ELECTRODE

It's a new semi-automatic process that uses no inert gas. Powdered flux is inside the electrode. Tubular electrode is automatically fed at proper speed from a reel inside nearby control box as operator squeezes trigger on gun. *(Lincoln Electric Company, Cleveland)*

5. PROGRAMED FUSION WELDING

It's completely automated under numerical control. This 600-amp. unit lays down precision welds at speeds up to 1600 inches per minute. *(Sciacky Brothers, Chicago)*

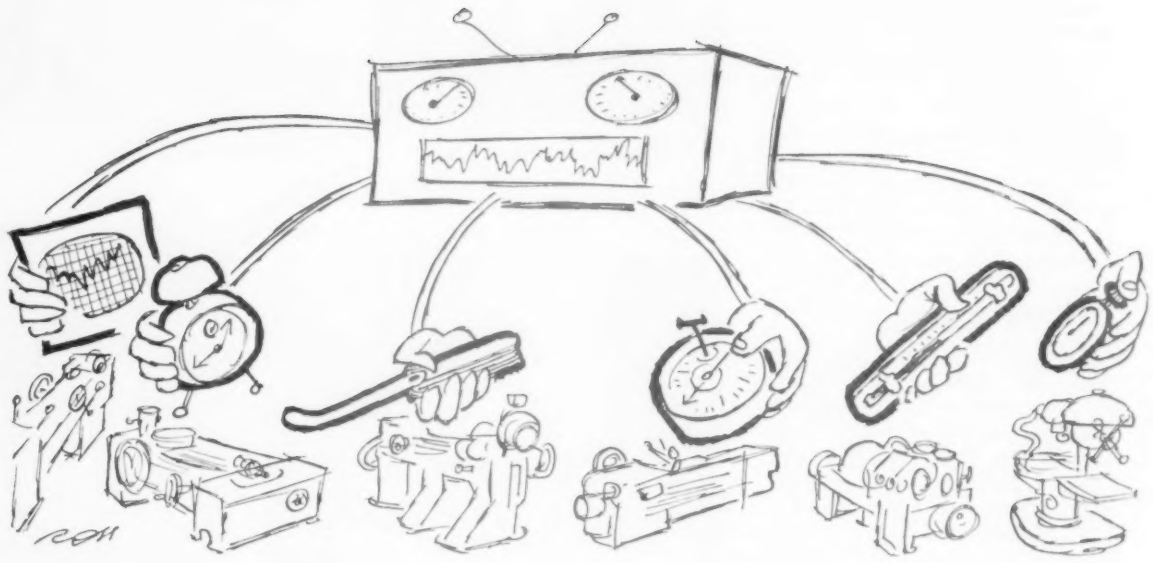
1. PLASMA ARC SURFACING.

2. FRICTION WELDING.

3. ULTRASONIC WELDING.

4. "STUFFED" ELECTRODE.

5. PROGRAMED FUSION WELDING.



The artist probably went a little overboard with this concept of the maintenance manager of the future. The manager is much more likely to be a keen technician with an analytical mind. But the idea of constantly gathering data about the operation of complex machinery is certainly sound. All over the world, there's a growing hue and cry about the impact of automation on the maintenance function. Downtime costs will be brutal. Trouble shooting will be far more difficult. Craftsmen may be specialized according to types of equipment rather than skill with particular tools. They'll strongly influence machine designers, if they can offer facts instead of opinions. This means gathering detailed maintenance data. One way is to . . .

MONITOR YOUR MAINTENANCE

Preventive maintenance should not be limited to preventing breakdowns. Its most important use is the long-range reduction of downtime and maintenance costs.

To do this, the program must be based on factual data, and be regularly reviewed as more facts accumulate. Also, there must be some way to measure the effectiveness of the program. In some cases, a manually prepared checklist or log will suffice. But too often people report what they *think* happened, as they remember it. Human memory is fallible, and where a particular trouble occurs infrequently, or may be corrected by any of several mechanics, it may well be that no one is aware of how much time and money are involved in this one problem. At best, if the job is remembered, the tendency is to become more proficient in making the repair, with little or no thought to eliminating the need for it. And men get busy, don't have time (or forget) to do the paper work.

When downtime is really important, or troubles are difficult to trace, a good way to avoid these hazards is to use automatic recording devices to produce an impersonal, objective record. It's not much of a trick to read voltages, pressures, or efficiencies where variances in them are meaningful. In some automatic machines,

By FRED H. SILL, Field Maintenance Division
Eastman Kodak Company, Rochester, N. Y.

minor jams are expected and rapidly cleared by the operator. It is relatively easy to arrange switches so that these trouble stops immediately show on an annunciator panel. Automatically recording the frequency and duration of such stops will provide information you can study later for clues to the reduction or elimination of recurring troubles. And this method of inspection doesn't require dismantling the machine. Tearing down and reassembly always present the hazard of introducing new problems—dirt gets into bearing or contact surfaces, critical adjustments get fouled up, and human error comes into play. Beyond all this, when parts move in contact with each other, wear patterns occur. When these patterns are disturbed, it is often almost impossible to reassemble everything precisely as it was.

Cost is always a consideration and this, too, points to the use of recording devices. Usually, it is relatively simple to connect a clock so that it runs only when the machine doesn't, or to hook up a counter to record the number of stops. A multipen operations-recorder will record both frequency and duration of downtime, and it takes surprisingly little clerical time to translate the recording into a useful report.

USE OF DATA

Data of this sort will arm the maintenance engineer with factual, quantitative knowledge. It will put him in a position to back up his opinions and judgments. He can keep tomorrow's machines from incorporating yesterday's mistakes. He'll know when the only sensible action is to shut down for repairs, and he can decide when replacement is wiser than further repair. Without data, his judgment on these matters is just opinion. But when he has the facts to justify his recommendations, he can expect more consideration and—perhaps more important—he can provide true maintenance service.

Once the data have been collected, a printed report can be produced showing the significant figures in meaningful form. For example, the time the machine is available for production can be shown as a percentage by taking out the maintenance time. In like manner, you can compute the percentage of available time during which the machine was actually used. Graphic presentation of the most significant figures provides a running record of the progress attained. The data can also be recast in any number of ways, to show correlations between problems and unexpected causes. Perhaps a particular trouble is found to occur most frequently at a certain time of day, or when certain personnel are present.

OUR EXPERIENCE

Over the past 10 years we have installed several completely automatic machines, each different from the others and performing different functions. These special film-processing machines were designed and built in our plant. Furthermore, they are operated in almost total darkness, around the clock. The need for a log is apparent, but we've never been anxious to collect data for their own sake.

Right after the new machines went in we expected a "debugging" period, but it stretched out longer than we had anticipated. Many troubles were intermittent. A component would malfunction once in 10 or 20 or 100 times. There was evidently a need for automatically recorded data, but some of our people were reluctant to agree to it. Some felt they were so close to the problems that they knew just what needed correction, but there was not always general agreement as to what the problems were. Inevitably, we found ourselves on a few wild goose chases.

We finally sold the idea of collecting factual data on what happened during each minute of each trick. A recorder connected to the annunciator panel proved to be a relatively inexpensive solution. With this equipment, causes of downtime were a matter of record, not opinion or memory. We also installed a system utilizing punched cards, on which all downtime is recorded. Mechanics record maintenance downtime by code, which shows the component they worked on and the part in the assembly that caused trouble. The cards are summarized automatically in a printed weekly report. The cards are also resorted and tabulated whenever a specific trouble shows up too often (exceeds pre-set limits). Frequently, the downtime is eliminated by adjusting the frequency of the preventive maintenance work. So far, we've had an over-all improvement of 15% in availability with this system. But action does not stop there. When the cause and the severity of the problem are known, we can easily justify redesign, where necessary—we have the facts.

With this much information available, we have become progressively less satisfied with opinion or judgment as to the cause of failure. More and more we have found instrument measurements valuable. By knowing the tolerable limits on the variables connected with persistent problems, we've been able to reduce trouble shooting and diagnosis to routine. The tools of diagnosis are becoming the feeler gauge, oscilloscope, stroboscope, volt-ammeter, and so on. And we have only scratched the surface. We have every indication that some measurements portray normal wear, and that a plot of these measurements will indicate the proper time for action. In this area we have the precedents of dynamic balancing of rotating equipment and the measurements of the gradual breakdown of insulation on electrical lines.

As a guide and control to keep us from spending dollars to save dimes, we calculate unit maintenance costs on these machines. The total cost of maintenance is divided by the total production for each period. To date, our program has sliced this index from 10.3 to 4.0. Many things can affect this index, of course, and additional spending on preventive work may not affect costs for some time—so the index must be used with judgment. But it does show the trend and keeps us from going too far astray.

CONCLUSION

This approach does not reduce the requirements for skill on the part of the mechanic. It's simply a tool to provide quantitative, factual data for the analysis of maintenance problems. And it's not a cure-all. But it can be a powerful weapon in the hands of an enlightened maintenance manager.

Facing up to
ELECTRONIC MAINTENANCE

Electrical Editor G. C. Quinn spotted these trends at the annual meeting of a topnotch, alert maintenance organization:

- **Labor contract straitjackets are loosening—but not enough.**
- **Despite best-in-the-nation adult education, California plants aren't satisfied with the pace of advance technical training.**
- **Control builders' instructions and drawings aren't good enough.**
- **Management is learning it has to spend time and money for effective preventive maintenance on complex electronic controls.**
- **High downtime costs are forcing a second look at maintenance.**

This year's annual conference of the Electrical Maintenance Engineers Association of California (EMEAC) at Los Angeles brought several hundred plant engineers and maintenance supervisors together. These men are struggling with many of the same problems that beset their counterparts everywhere else—plants beginning to show their age, crews top-heavy with seniority and short on needed skills, and pinched budgets.

California plants have some advantages in their favor. There are 65 junior colleges in the state—about two-thirds of them within the Los Angeles metropolitan area—where almost all EMEAC membership comes from. These city-owned colleges are eager to cooperate with local industry and groups like EMEAC in providing night courses in all levels of advanced training. An informal poll at the meeting showed that well over half of all electrical or electronic maintenance personnel supervised by EMEAC members have taken advanced courses within the last few years.

Interest was perhaps keenest in an experience-packed session on electronic maintenance. Many supervisors spoke of success in retraining older electricians and mechanics, and in negotiating for more flexibility in assigning men of high skills but low seniority to critical electronic and hydraulic control maintenance. Few unions have opposed screening exams when a new electronic or instrument technician classification is set up within a bargaining unit. But employers have been unable to get any general agreement with either IBEW or CIO locals for preferential hourly rates for these hard-to-find people.

The concern over the danger of losing skilled electronic technicians may not be justified. "We have lost only 2 to 3% of our trained electronics men," Wallace Wingert of North American Aviation, Inc. (Los Angeles) pointed out. Other supervisors claimed similar experiences. "Retraining an industrial electrician into an industrial electronic technician used to require 300 hours. Lately we've cut the course to 80 hours with some success," commented Wingert.

"Where control equipment isn't designed for fast maintenance we modify it. Ten minutes' downtime at press time means a serious loss for certain editions," said George Poate of Hearst Los Angeles Newspapers. "We've had machine-mounted controls that used to require new tubes every two weeks. We moved the controls away from vibration, and tubes now last nine months."

"We speed trouble shooting by redrawing control blueprints in block diagram form, showing stage output points and interconnections," said Gerald W. Anderson of U. S. Rubber Company (Los Angeles). "If you want top performance from the control systems you buy, be sure you provide for expansion. Never skimp on accuracy. Spend money on the right test equipment. Meter relays are more dependable than relays controlled by thyratrons. Install panel meters in motor circuits and record motor field and armature resistances before releasing new equipment to production."

What you should know about walkie trucks

Here's a motorized lift truck that has handling capability similar to its bigger brothers but is more maneuverable. It doesn't need a skilled driver. The operator just walks it along, guiding it with simple handle controls. It's smaller, lighter, and slower than driven types and therefore eminently suited for service in congested areas and for short hauls. It is almost accident-proof because dead-man controls—a special safety feature standard on most trucks—automatically stop it when the handle is upright or in its lowest position.

You can get this truck with electric, gas-electric, or straight gas power, with fixed or elevating platform, and with fork or pallet lift. The high lift truck can be supplied with most of the attachments used on standard driven types. Safety features to check when buying are brakes, position of controls, protection for driver's hand, clearance for operator's foot along understructure, and control valves to limit lowering speed if hydraulic or mechanical system should fail.

Whether you use it as a replacement for the more expensive driven-type lift truck, or merely as a supplement to it, this truck can be a real boon to your material handling operation.

Turn the page for a tear-out fact sheet on where to buy, and how to get more information on these mechanical handymen.

. . . Fact file on walkie trucks

"WALKIE" TRUCK TYPES

Counterbalanced: In 1000-, 2000-, 2500-, and 3000-lb. capacities for high stacking. Telescoping mast tilts forward or back.

Outrigger: Capacity to 4000 lb., short length; low total weight for narrow aisles. Load carried on forks—dual outrigger wheels stabilize during stacking.

Pallet: Handles stringers, single or double-faced pallets. Supplements stacking equipment.

Platform: In both high- and low-lift design, 4000- to 6000-lb. capacities. Handles skid loads. Low cost—makes power stacking in small plants economical.

Tractor: Ideal for towing large volumes a long distance. Acts as tow for trailers or with coupling devices to form trailer train.

ASSOCIATIONS

Material Handling Institute and Industrial Truck Assn., Suite 759, Gateway Center, Pittsburgh. L. Shea West, Exec. Sec'y-Treas.

American Material Handling Soc'y., W. B. McClelland, 2860 E. 130th St., Cleveland 20.

HANDBOOKS

Materials Handling Handbook, Harold A. Bolz, Ronald Press, 1958, Section 40, pages 15-17.

Materials Handling Equipment, D. O. Haynes, Chilton Co., 1957, Chap. 30-31.

Powered Industrial Trucks, Industrial Truck Assn., 1957, page 35.

Handbook of Material Handling, Industrial Truck Assn., 1950.

BOOKS

Plant Layout & Materials Handling, J. M. Apple, Ronald Press, 1950.

Industrial Materials Handling, Curtis H. Baker, Lincoln Extension Institute (Cleveland), 1950.

Modern Methods of Materials Handling, Material Handling Institute, Prentice Hall, 1951.

Material Handling, John R. Immer, McGraw-Hill Book Co., 1953.

Material Handling Equipment, Matthew H. Potts, Pitman, 1946.

Material Handling: Principles, equipment, and methods. Harry E. Stocker, Prentice-Hall, 1943.

Material Handling Casebook, L. K. Urquhart and Carroll Boyce, McGraw-Hill Book Co., 1951.

STANDARDS

ASA B56.1 Safety code for powered industrial trucks (ASME).

MANUFACTURERS

Automotive Transportation Co., 101 W. 87th St., Chicago 20.

Barrett-Cravens Co., 630 Dundee Rd., Northbrook, Ill.

Big Joe Mfg. Co., Wisconsin Dells, Wis.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

Colson Corp., 7 So. Dearborn, Chicago 3.

Crown Controls Co., New Bremen, Ohio.

Economy Engineering Co., 4511 W. Lake St., Chicago 24.

Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass.

Lift Trucks, Inc., 2425 Spring Grove Ave., Cincinnati 14.

Mobilift Co., Div. of Minneapolis Moline Co., Hopkins, Minn.

Moto-Truc Co., 1953 E. 59th St., Cleveland 3.

Raymond Corp., Greene, N. Y.

Revolvator Co., North Bergen, N. J.

Towmotor Corp., 16100 Euclid Ave., Cleveland 12.

Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15.

West Bend Equipment Corp., West Bend, Wis.

CATALOGS (free from company)

Automation Transportation Corp.
Transporter Facts & Factors, 16 pages on walkie-type truck.
Standard vs. Specials, 8 pages tell which truck suits your needs.
Trucks, 8-page bulletin on which is better—walkie or rider?
Truck Selector Guide, 20 pages.

Big Joe Mfg. Co.
Lift Trucks, 24 pages, No. 257

Barrett-Cravens Co.
48 Ideas for Improved Material Handling, Bulletin No. 552.

Clark Equipment Co.
Industrial Trucks, 16 pages.

Colson Corp.
Handling Equipment, 100 pages.

Economy Engineering Co.
Lighting Equipment, 40 pages, No. 55

Lewis-Shepard Products, Inc.
Training Fork Truck Operators, 25 case studies on how manufacturers solved material handling problems, 28 pages.
Power Trucks, 16 pages, No. 80-204.
Lift Trucks, 132 pages, 5-section index (1956).
Pallet Truck (walkie electric), Circular 34c.

Material Handling Institute
Library of Know-How Booklet No. 1—includes basic concepts of industrial material handling.
Industry Report 105—How to get the most out of your lift truck.

Moto-Truc Co.
Walkies, No. 56 W.

Towmotor Corp.
Pertinent Facts on Material Handling—illustrated booklet.
Fork Lift Trucks, 32 pages.

Yale & Towne Mfg. Co.
"How-Book," 24 pages.

EDITORIAL DATA

Special Report on Material Handling in Atlanta, FACTORY, Nov. 1960, Reprint No. 245.

New or Used Lift Trucks: How to Choose the Right One: FLEET OWNER; May 1957, page 94.

FILMS

Material handling films, Material Handling Institute, 14 pages.

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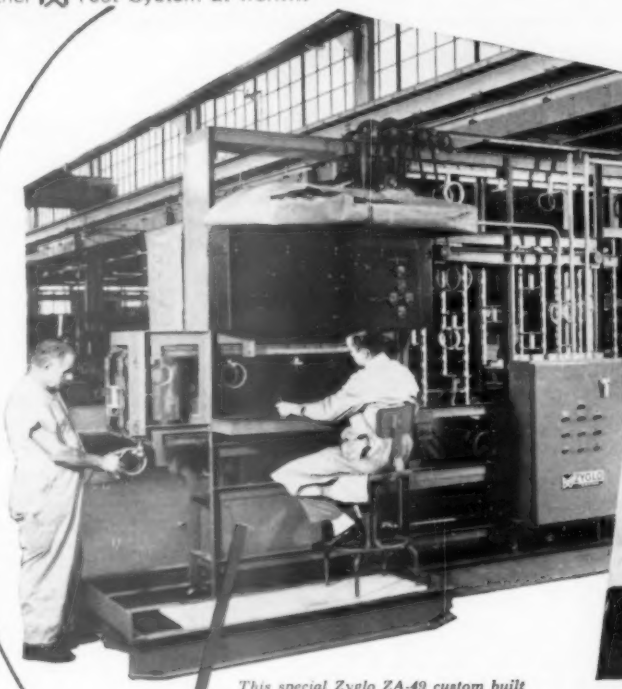
Another Test System at work...



This special Zyglo ZA-49 custom built for SKF Industries, includes an endless conveyor to move parts through the various inspection processing steps in timed sequence. One man can handle entire operation.

Magnaflux Field Engineer, (at right), discusses acceptance standards with Rudolph Sansonneti, Chief Inspector and Henry McNeal, Production Engineer, Airborne Accessories Corporation, Hillside, N. J. Unit is standard Zyglo ZA-37.

You Save Money Finding Cracks with ZYGLO—Large or Small

Fluorescent Penetrant Test for Nonmagnetic Materials

The big machine above is a specialized, automated Zyglo System with which one man tests up to 375 non-ferrous bearing cages per hour for cracks, porosity, or leaks. It includes complete conveyorized handling and programmed processing, custom engineered and built by Magnaflux. Parts tested range from ¾" I.D. to 10" O.D.

The inset shows a hand-operated Zyglo ZA-37 used to test critical aircraft parts—from small screws in batches, up to 9-lb., 6" x 18" components.

Dozens of other Zyglo Units and Systems—larger, smaller and in between these examples—are available in standard, productionized-standard and specially engineered installations. Whether you need to test thousands of small parts per hour, a few large ones, or any combination, there's a Zyglo to meet *your* specs and savings objectives.

Further, no less than 26 precisely formulated Zyglo Test Materials provide 100% reproducible results at any degree of sensitivity you require. You never need over or under inspect with Zyglo.

For further information on Zyglo savings and quality standardization, phone our local Magnaflux Field Engineer, or write Magnaflux Corporation, 7316 W. Lawrence Avenue, Chicago 31, Illinois.

MAGNAFLUX CORPORATION
TEST SYSTEMS

A SUBSIDIARY OF GENERAL MILLS

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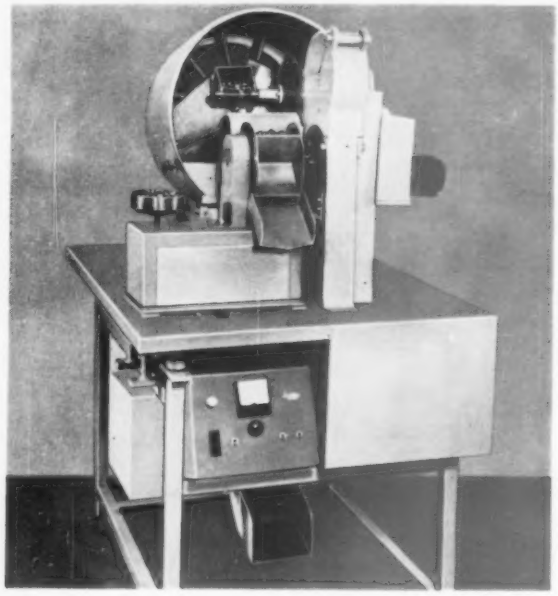
For more data, circle item numbers on Reader Service Card next to back cover.

Counting and batching in one operation



Why bother with separate components to prepare parts for packaging, bulk shipping, inventory controls, etc., when this one piece of equipment will do? Not only does it count automatically by weight, but it also batches in small lots, handling up to 450,000 items per hour. Counter accepts parts such as paper clips, ball-bearing assemblies, and fasteners weighing from 0.01 to 2.5 oz. and under 2 in.

Fast changeover in counting entirely different parts is a main feature. In about 2 min., an operator can stop one counting operation, empty the machine, re-set simple controls, and begin counting again.

Principal elements of the unit include a revolving hopper, rapid weighing electronic scale, count indicator, output chute, and control that automatically starts and stops a conveyor.

When batch counting, unit can be pre-set for several hundred pieces, depending on need. It can be set either to count exact number of pieces or to accept deviations up to plus or minus 6 pieces. Visual indicator shows exact count, or whether batch is over or under weight.

All-transistor equipped; rugged, for long, trouble-free operation. *Atronic Products, Inc.* (Circle 88)

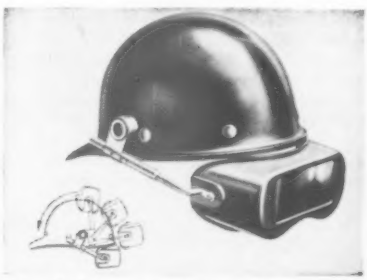
89—Whip hammer, for use where utility power is lacking, drives drill through masonry five times faster than hand hammer. Handle whips forward and back, causing sliding bar to hit tool. *Cuyahoga Stamping Co.*

90—Pallet loader automatically stacks heavy, cumbersome cartons in tiers. One operator guides and transfers cartons from loader to pallet. Accepts pallets to 48x50 in., capacities to 3000 lb. *Hansford Mfg. Corp.*

91—Flexible Teflon hose, for steam and high-pressure liquids, resists wear and corrosion. Rated to 250 psi. for steam, otherwise to 500 psi., and 500 F. From ⅛- to 1-in. pipe threads. *Resistoflex Corp.*

92—Air grinder has speeds of 6000 to 15,000 rpm. for rapid finishing in metal grinding or buffing. Grip or straight handles, thumb or lever throttles, in 12 lightweight models. Quiet, safe. *Ingersoll-Rand Co.*

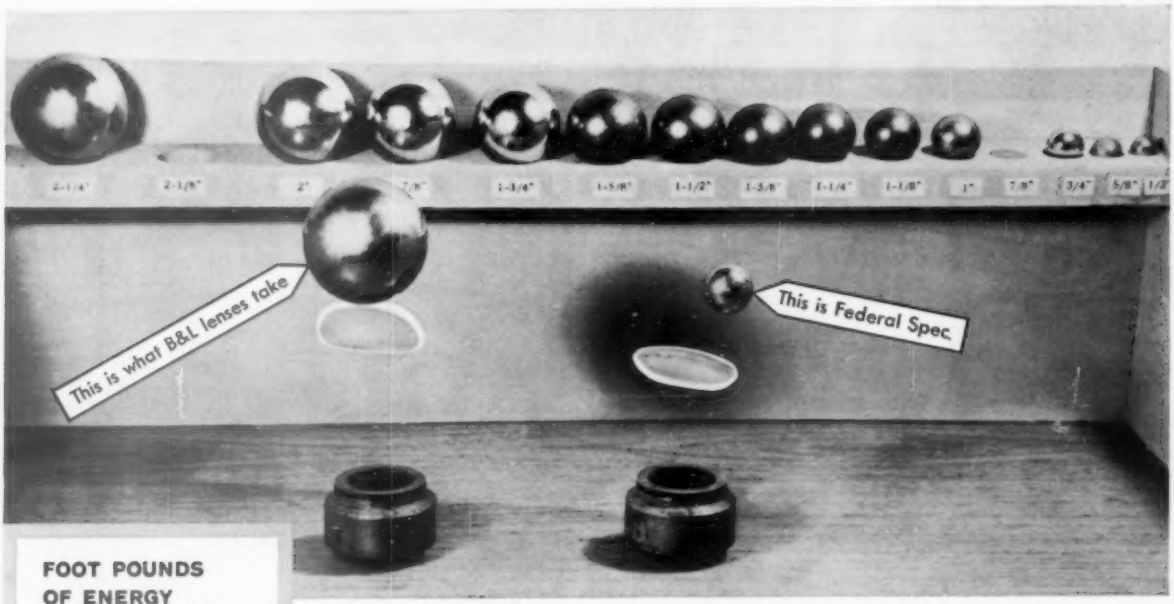
93—Heavy-duty crane uses combination of power hoist and boom for easy handling by one man. Unit is equipped with full-swivel casters. "Rox" model permits precision spotting of heavy parts with ease and safety. Various sizes and capacities available. *Auto Crane Co.*



94—Safety cap-with-goggles combination has telescoping aluminum sidearms that permit rotating goggles over cap (to 180-deg. arc), when not in use. Quick-Lok attachment allows use of goggles on maker's helmets, shields, or masks. *Fibre-Metal Products Co.*

95—Teleguide gives step-by-step audio and visual instructions to operator for assembly of intricate circuits. Minimizes errors and cuts assembly time. Is also useful as training tool. Consists of projector, screen, and tape recorder with earphones. *La Belle Industries, Inc.*

Turn the page



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Bausch & Lomb Bal-SAFE lenses twice as tough as Federal Standard

In the picture above, you see two bouncing steel balls stopped in mid-air by the high speed camera. The balls were dropped simultaneously from a height of more than 4 feet. Federal Standards Bureau specification for safety lens impact resistance requires exactly this test, using the 7/8" diameter steel ball you see on the right. Truth is, B&L Bal-SAFE lenses withstand impact from 2 to 10 times greater than Federal specification.

By B&L standards, every lens must withstand the shock of a 1⅛" diameter steel ball, or twice the impact of the 7/8" ball. This extra safety is engineered through a special B&L lens toughening process that adds *not a penny of extra cost to you.*

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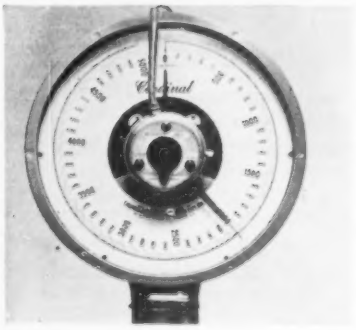
3-D swirling easy on parts and costs

Increase production, save time, and lower costs with this new finishing mill. It combines vibratory, barrel, and rotary motion to cause an unusual spiral action on parts (left photo). This gentle movement polishes and deburrs metal, plastic, and fragile ceramic parts.

Simple design uses low hp. motor, offers low maintenance. Can be installed without foundations or pads because of lack of vibration. Needs only one adjustment to decrease or increase motion. Unloading is through quick-opening side door. Open top permits spot checking. Sizes: 1, 3, 10 cu. ft. *Southwestern Engineering Co.* (Circle 96)

No more missing production data

Here's a machine to record production information that aims at breaking the "input" bottleneck in electronic data processing. Mobile Stanrecorder goes to operating site to record inventory, tools, breakdowns, maintenance, scrap reports, etc. Operator punches variable data on standard numerical keyboard and feeds machine with special plate and pre-punched cards to complete recording action. The result can be "read" and translated directly into machine language. *The Standard Register Co.* (Circle 97)



Automatic flow cut-off

You can install this automatic cut-off control for all dial-type scales quickly and economically without modifying scale itself. Microset can be operated by one man with a simple dial setting and the pressing of a button. Comes with either single or two-stage cut-off, and optional circuit arrangements to fit most needs. *Cardinal Scale Mfg. Co.* (Circle 98)

99—Nailless pallet, assembled with water-resistant glue and reinforced with steel tie rods, endures rough handling. Treated wood prevents warping. Leases for less than penny a day, repairs or replacement included. *U. S. Pallet Co.*

100—Relay, 300-volt, 10-amp., occupies small panel space; has out-in-front terminals. Sides of relay plus snap-on cover serve as wiring trough. Simple-to-maintain visible contacts. Quickly modified to multipole forms. *General Electric Co.*

101—Air gun has nozzle that flexes to release air. Air cuts off when finger pressure is relaxed. Made from grease-resistant neoprene and brass rod. No handles, levers, or springs. Fits ¼-in. thread. *Heckethorn Mfg. & Supply Co.*

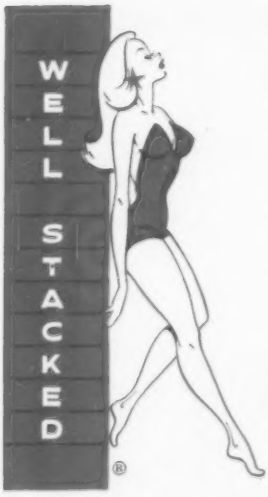
102—Mobile tank of nylon fabric and rubber stores or transports liquids. Rugged body resists damage from fuels and gasolines, etc. Comes in 60- to 350-gal. capacities, 8 sizes. Empty tank rolls up like rug. *Goodyear Tire & Rubber Co.*

Turn the page

FLEXIBILITY

EMI *air-row head pallet racks*

the most flexible,
cost saving and work saving
racks in the industry.



EMI *air-row head DRIVE-IN RACKS*
EMI *air-row head DRIVE-THRU RACKS*

These strong, efficient, space-saving racks are all engineered on the AIR-ROW Head principle with basic interchangeable parts.

EQUIPMENT MFG. INC.

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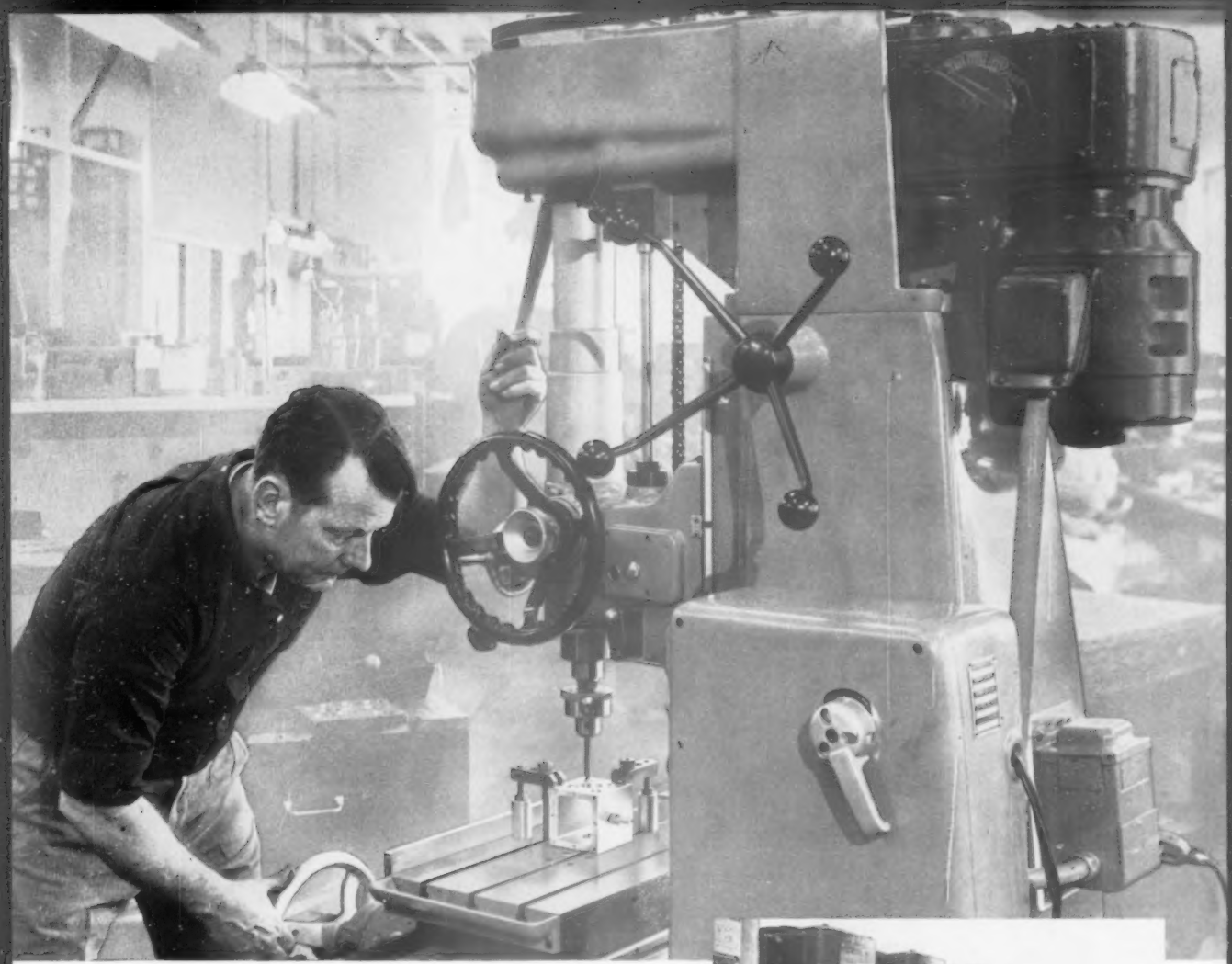

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"On our Model 1½ Jig Borer...

General Electric Polydyne® Drives Help Us Maintain 0.000070"* Accuracy"

"Efficient control of vibration is the reason that the majority of our Model 1½ jig borers are equipped with General Electric Polydyne drives. Competitive drives have never fully solved this problem," states A. A. Lindberg, Design Engineer for Moore Special Tool Co., Bridgeport, Connecticut.

"Moore tests each Polydyne drive on a specially constructed bracket," continued Mr. Lindberg. "Vibration readings are taken at three points, and every Polydyne drive tested has been under the vibration limit of 0.001 inch and virtually free of operating noise.

"Another reason that our Model 1½ has proved popular is that the Polydyne drive gives an infinite number of operating speeds with just a simple adjustment of the dial to the desired rate."

When your application requires low-cost adjustable speed combined with reliability and ease of maintenance, investigate G-E Polydyne drives. Your General Electric Sales Engineer has full details. Or, write for bulletin GEA-6806, Section 854-06, General Electric Company, Schenectady 5, N. Y.

* Seventy Millionths

GENERAL ELECTRIC

For more facts Circle 442 on Reader Service Card

GENERAL ELECTRIC OFFERS A *COMPLETE* LINE OF LOW-SPEED DRIVES 1/8 TO 200 HP

Select from G.E.'s PLUS LINE of compact mechanical power transmission equipment! A full range of ratings is available—many directly from stock.

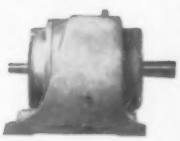
General Electric Polydyne Drive

Integral-type Gear Motor

Right-angle Shaft Gear Motor

All-motor Gear Motor

Footed Speed Reducer



Shaft-mounted Speed Reducer

Member of American Gear Manufacturers' Association

GENERAL ELECTRIC

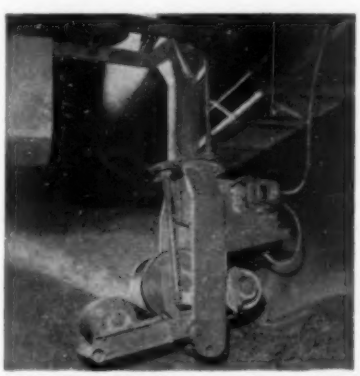
Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

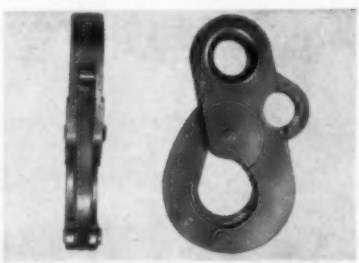
103—Fluorescent inspection lamp is enclosed in, and protected by, transparent tube made of Tenite butyrate plastic. Good for work areas where normal lighting is inadequate or inaccessible. Resists impact and breakage, is watertight. For 120 and 220 volts. $18.50. *Technico.*

104—Venturi valve handles corrosive, toxic, or radioactive fluids at room, cryogenic, or high temperatures. Line pressure, not hydraulic or pneumatic power, opens and closes valve. Can be operated manually at any pressure. For ½- to 8-in. pipes. *Fox Valve Development Co.*



105—Speed loader spreads (to 8600 cfh.) free-flowing bulk materials (in granules to 2-in. diameter) in any direction from given point. Quickly, easily controlled by operator. Good for loading trucks, filling storage areas, stock-piling. *Ft. Worth Steel & Machinery Co.*

106—Cable suspension system is ideal for obstacle-studded installations. Flexes in one plane, is rigid and non-sagging in opposite one. Bends along flexible plane using smaller radii than with standard conduit. No special tools to install. *Perfect-Line Mfg. Corp.*

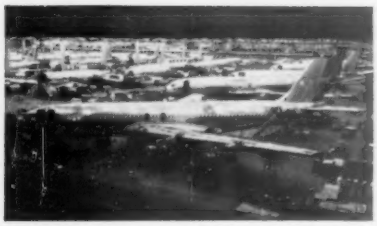


107—Safety hook has positive lock that prevents opening under any load conditions. But it releases, even while loaded, by pulling ring without hazard to operator. Combines ease of hook with safety of shackle. Adapts to most fittings; lightweight but strong. *Merrill Bros.*

108—Tilt-er-Tool, is light dolly and platform mover. Puts wheels under equipment for easy transport. Works on lever principle; apron goes under equipment as operator's foot presses down other end. Action tilts it to balance point for moving. *Automatic Service Supply Co.*

Turn the page

Boeing saves manhours, expedites parts requisitioning with Electrowriter® Systems



When key production or field areas at Boeing's Transport Division urgently need parts, they request them by writing directly on Electrowriter Transmitters to . . .

. . . remote parts stores. Here, written requests are instantly recorded as the sender writes. Stock clerks take Electrowriter messages, quickly fill orders.

Electrowriter Systems have streamlined special parts requisitioning for the Transport Division of Boeing Airplane Company at Renton and Seattle, Washington. Formerly, urgent parts requests were handled by messenger, telephone, or squawk box. Now, with Electrowriter substantial savings in manhours are effected on the production lines and in parts stores. The savings pay for the Electrowriter Systems many times over. There are no more verbal mixups or delays. Immediate transmission of written requisitions speeds receipt of parts and provides permanent records which pinpoint responsibilities. At the parts stores Electrowriter receives questions completely unattended, releasing personnel for order filing.

Electrowriter combines the speed of the telephone voice with the accuracy of written instructions. Send for complete information.

Electrowriter®
COMMUNICATIONS SYSTEMS BY
COMPTOMETER

Comptometer Corporation, 5600 Jarvis Avenue, Chicago 48, Illinois. SPring 5-2400. Offices in Principal Cities.

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

109—Ultrasonic flaw detector operates without liquid coupling commonly used in such devices. Uses dry membrane which fits tightly over transducer. Non-destructively tests absorbent materials such as graphite and solid propellant fuels. Direct readout. *Circo Corp.*

110—Wall-type file handles and stores blueprints, drawings, other large sheet materials. Each sheet hangs flat—requires less storage space, eliminates curl. Rubber-tipped lock clips hold many sheets in each hanger. For 30- to 42-in. sheets. *Lewbill Industries, Inc.*

111—Light bulb is silicone-coated to protect it from spatterings of molten metal and other types of severe punishment. Coating withstands high-ambient temperatures and heat generated by 100-watt bulb. Good for welding, heat treating, foundries. *General Electric Co.*

Turn the page

Quality... the best economy of all

Another product of Sunoco research . . . a fire-resistant hydraulic fluid

The flame test, above, dramatizes the effectiveness of Sun's new fire-resistant hydraulic fluid. The wick in the conventional fluid burns readily; the wick in Sun's new fluid just can't be lighted.

SUNSAFE, a water-in-oil emulsion, eliminates fire hazards . . . provides increased safety to personnel and equipment. At the same time, operators get the essential performance characteristics of a top-grade hydraulic oil—low rates of wear, long service life, and protection against rust and corrosion.

This combination of *quality* in engineering know-how, and *quality* in product, proves once again that *quality* in any sense is the best economy of all.

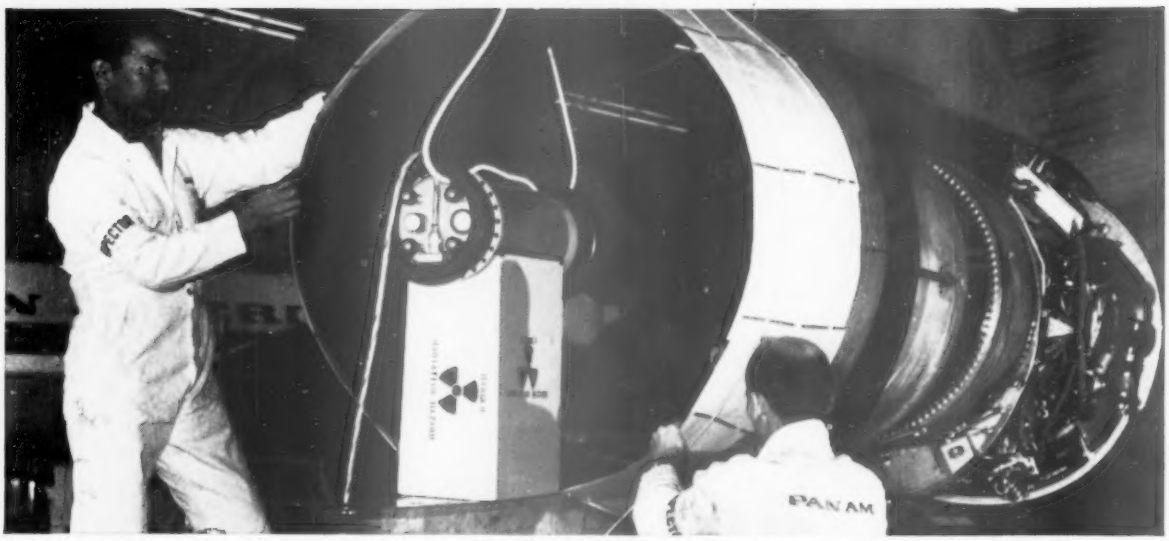
For 73 years Sunoco has meant quality right down the line. Today, this quality is found in more than 400 Sunoco industrial products. SUN OIL COMPANY, Phila. 3, Pa., Dept. I-14.

In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO®

PRINTED IN U.S.A.



Pan Am inspectors position Kodak Industrial X-ray Film and 360° x-ray unit to radiograph jet engine thrust ejector.

It throttles the roar of a 16,000-lb. thrust

Thrust ejectors on jet engines must be examined every 400 hours. Pan American Airways does it radiographically—cuts inspection time more than 90%.

To remove the floating skin on a jet thrust ejector and check its insides takes a lot of expensive man-hours. But Pan Am gets the answer—now—in one-tenth the time.

By wrapping both Type AA and Type M Kodak Industrial X-ray Film around the ejector, a single exposure with a 360° x-ray head provides inspection of both thin and thicker sections of the unit.

This is another example of the way radiography saves time and guards quality. It inspects enclosed assemblies. It examines castings for inclusions, voids and shrink. It proves the soundness and continuity of welds. And in every case provides a record for reference.

Radiography can save you time, save money, and build a reputation for high-quality work. If you'd like to discuss how it can help you, get in touch with an x-ray dealer or write us for a Kodak Technical Representative to call.

Radiograph reveals structural parts sound but discovers an air pipe clamp is broken.

Now . . . Ready Pack in ROLLS and SHEETS Kodak Industrial X-ray Film, Types AA and M in 200-ft. rolls (16mm, 35mm, 70mm) and sheets (8 x 10, 10 x 12, 11 x 14, 14 x 17).

- No darkroom loading—film sealed in a light-tight envelope.
- Just place Ready Pack in position and expose.
- Film protected from dust, dirt, light and moisture.
- In the darkroom—remove film from envelope and process.

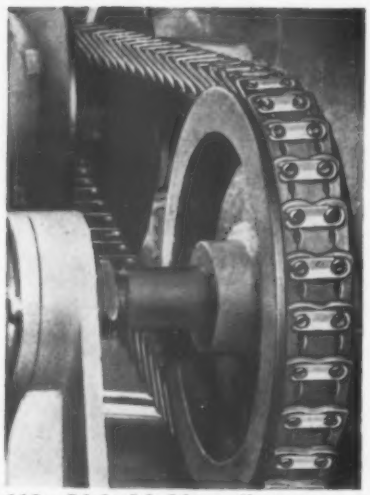
EASTMAN KODAK COMPANY
X-ray Sales Division Rochester 4, N. Y.

Kodak
TRADE MARK

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.



112—Linked belting adjusts to any length. Fits all V to V drives, is interchangeable with all endless molded and wood block belts. Single or twin links, widths from ⅞ to 4 in. Resists oil and heat. Installs with pliers and hook tool. *Lovejoy Flexible Coupling Co.*

113—Machine tool, numerically controlled, is designed on building-block principle with three work heads, available separately. For milling, drilling, boring, tapping, reaming. Universal head stores up to 30 tools, changes them in less than 3 sec. *Hughes Aircraft Co.*

114—Electronic relay, triggered by control signal of 1.8 microamp. or less, will switch up to 15 amp. Fast-acting; operates solenoids, heaters, regulators, instruments. When energized, built-in signal light goes on. Steel housing needs little care. *Central Scientific Co.*

Turn the page

It Pays to Have GOODALL
Quality in Every Hose You Use

Trust Goodall craftsmen to build into every length of hose they make, the extra measure of strength and durability that means longer, more reliable, more economical service. Here are some leaders in the line you can use with **profit.**

STEAM. "Inferno"—The best-known hose in its field for all high-pressure, high-temperature applications, including steam cleaning, degreasing and fire smothering.

AIR. "Brown Cord"—for all types of pneumatic tools. Lightweight, flexible. Tough, wear-resistant cover. Oilproof tube.

WATER. "Cloverleaf"—the best all-round water hose you can buy for mill and factory service. Available in lengths up to 500 ft.

GENERAL-PURPOSE. "Allserv"—for practically any job in your plant—air, water, gasoline, oil, mild chemicals, paint spray, welding.

HYDRAULIC. Goodall Hydraulic Hose will give outstanding service on your high-pressure control lines, greasing equipment and constant feed lubrication systems. Available plain or as complete Hose Assemblies.

HOSE FOR SPECIAL SERVICES
PAINT & VARNISH SPRAY
HIGH-PRESSURE SOLVENT
ACID • BEVERAGE • AMMONIA
GREASING • WELDING

"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch for Details and Prices

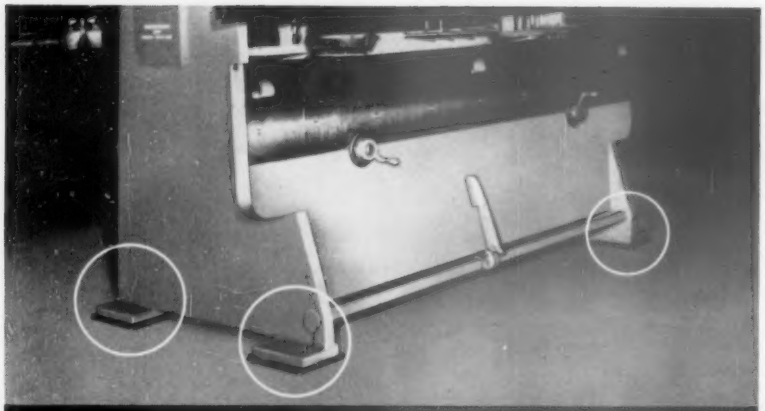
Manufacturers of Mechanical Rubber Products—Since 1870

Standard of Quality HOSE • BELTING • FOOTWEAR
CLOTHING • EXPANSION JOINTS • PACKINGS • LINERS, ETC.

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N.J.
Branches and Distributors Throughout the United States and in Canada

For more facts Circle 446 on Reader Service Card



YOUR UNISORB DISTRIBUTOR

Can help your machines get a More Productive Foothold!

Do you have any of these problems: Big press or other machine to relocate quickly, inexpensively? Prevention of transmitted vibration . . . induced vibration? Irregular plant floors?

If so, call in the Unisorb distributor. He knows Unisorb mounts can cut machine installation time up to 80% . . . prevent up to 85% transmitted vibration . . . control induced vibration . . . level machines quickly . . . muffle noise.

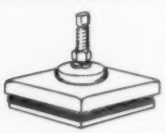
He knows Unisorb-mounted machines produce more efficiently. Equipment can run at higher speeds — production increases. Workers do a better job, are less fatigued when noise is controlled.

Machine alignment is improved, too: fewer replacement parts are necessary, tolerances are easier to hold. Maintenance of structures is lowered, floors are not damaged by drilling (no lag bolts nor screws are needed).

ASK YOUR DISTRIBUTOR ABOUT

UNISORB PADS
The basic vibration control unit. Many densities, thicknesses. Have successfully mounted machines up to 275,000 pounds.

UNISORB LEVEL-RITE "200" and "500"
Support maximum loads of up to 750 lbs. per unit. Low cost, precise leveling and vibration control for light and medium-duty machines.



UNISORB LEVEL-RITE
Universal self contained leveling device for all types of machines. Available in a family of products to support maximum loads of up to 7500 lbs. per unit. Fast, easy, precise leveling. Available with exclusive screw-post design or as a basic mounting plate for built-in leveling devices.

SEND FOR FREE SAMPLE AND NAME OF DISTRIBUTOR NEAREST YOU

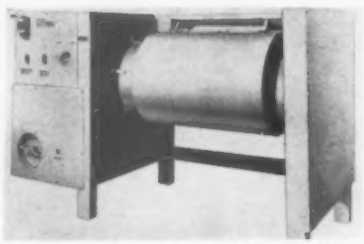
UNISORB

Division of The FELTERS Company
UNISORB 206 SOUTH STREET, BOSTON 11, MASSACHUSETTS

Begins on page 124

EQUIPMENT NEWS

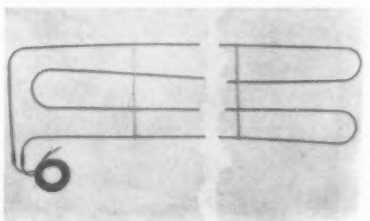
For more data, circle item numbers you want on Reader Service Card.



115—Tumbling barrel has variable speed drive and motor to produce vibration, rotation, or combination of both. Handles sequential finishing jobs without reloading barrel. Uses no springs; supported by rubber mounts. Barrel is detachable. *Minnesota Mining & Mfg. Co.*

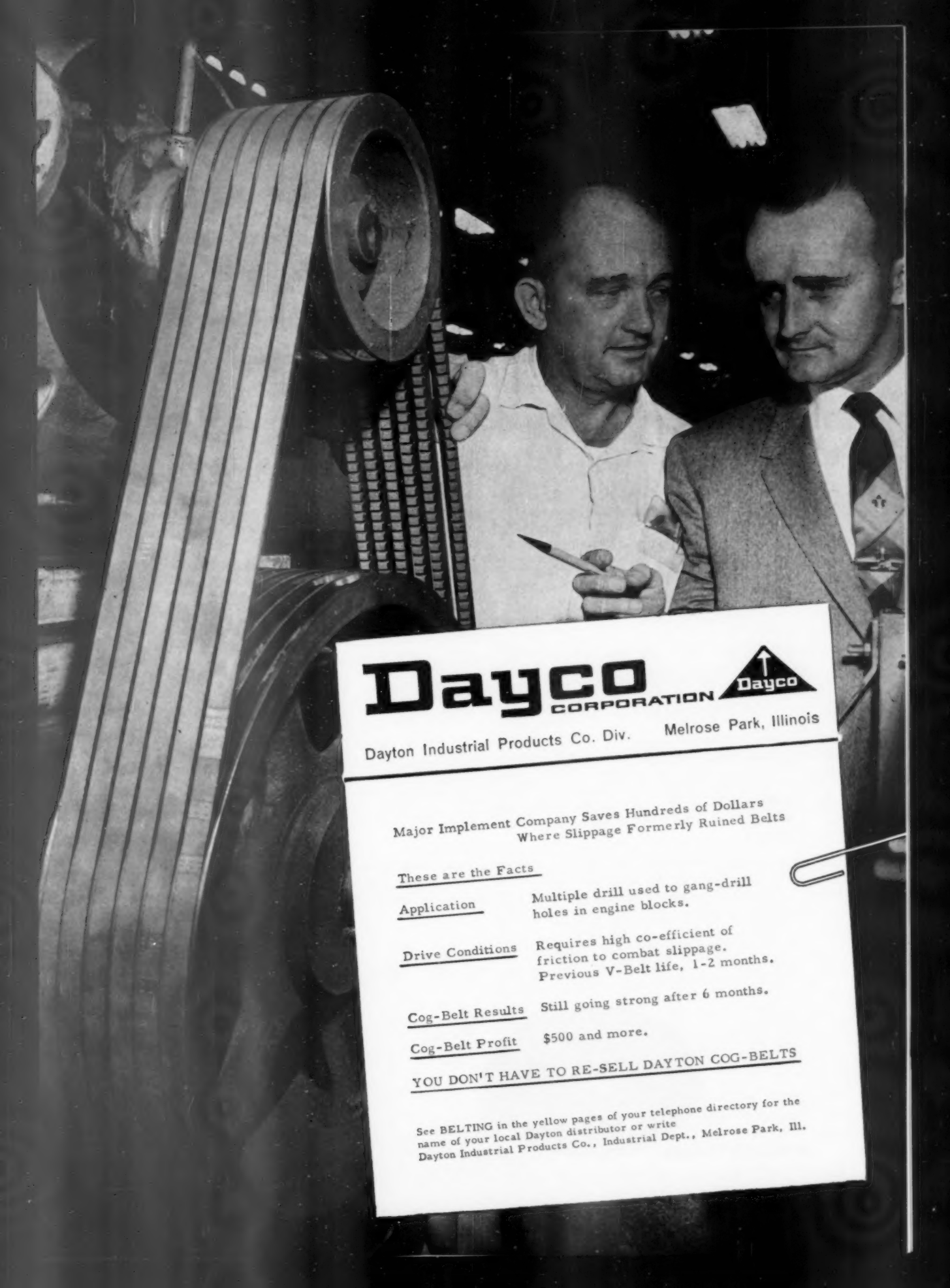
116—Motor starter has new cadmium oxide silver contacts. Pole-face wear cannot reduce air gap. Doesn't "hang" under low voltage. Solenoid coils are molded. In sizes 00 to 5, ratings from 1½ to 100 hp., 220 volts; 2 to 200 hp., 440-550 volts. *Allen-Bradley Co.*

117—Transistorized static controls regulate cylinders, clutches, and brakes using standard static switching modules on printed circuit boards. Any combination of logic devices. Easy to service. No moving parts mean increased efficiency, reliability. *General Motors Corp.*



118—Heating cable can be embedded in asphalt, macadam, or concrete driveways and walks to clear ice and snow. Withstands 300 F. when installed in hot-pack asphalt. Flip of switch turns it on. In 24-ft., 400-watt; or 40-ft., 675-watt; both 240 volts. *Edwin L. Wiegand Co.*

Turn the page



Dayco CORPORATION

Dayton Industrial Products Co. Div. Melrose Park, Illinois

Major Implement Company Saves Hundreds of Dollars Where Slippage Formerly Ruined Belts

These are the Facts

Application	Multiple drill used to gang-drill holes in engine blocks.
Drive Conditions	Requires high co-efficient of friction to combat slippage. Previous V-Belt life, 1-2 months.
Cog-Belt Results	Still going strong after 6 months.
Cog-Belt Profit	$500 and more.

YOU DON'T HAVE TO RE-SELL DAYTON COG-BELTS

See BELTING in the yellow pages of your telephone directory for the name of your local Dayton distributor or write Dayton Industrial Products Co., Industrial Dept., Melrose Park, Ill.

PLANT SITE PROBLEM?

Q. Want to know where to get detailed, factual information about labor supply, market potential, raw materials?

A. *Niagara Mohawk's area development specialists have a wealth of such data about Upstate, New York right at their fingertips.*

Q. Wondering how to solve special plant site problem unique to your company?

A. *Niagara Mohawk can help with special research to get the answers you need. Work for other companies has ranged from finding a special type of water for one, to locating a special type of labor force for another.*

Q. Want evidence that *your* kind of business can prosper in Upstate, New York?

A. *New York is the most highly diversified area in the Union. It has the highest average of skilled workers and foremen in its labor pool . . . natural resources are abundant and varied . . . plenty of clear, clean water . . . big timber tracts . . . plenty of low cost electric power and natural gas.*

Q. Transportation a vital consideration for you?

A. *Air, rail and superb Thruway facilities provide overnight access from Upstate, New York to the great metropolitan markets of the northeast and neighboring Canada. And you can reach the seaports of the world through the new St. Lawrence Seaway.*

Q. How's the living in Upstate, New York?

A. *Plenty of elbow room here, and plenty of recreation facilities. Fishing, hunting, golf, boating, skiing, some of the world's finest parks and preserves. A fine place to raise children . . . New York's educational system is second to none.*

Q. How do you get more information about solving your *specific* plant location problems?

A. *A phone call, wire or letter will get the ball rolling. Contact Richard F. Torrey, Niagara Mohawk Power Corporation, Dept. FA-6, 300 Erie Blvd. West, Syracuse 2, N. Y. Phone GRanite 4-1511. No obligation, and completely confidential, of course.*

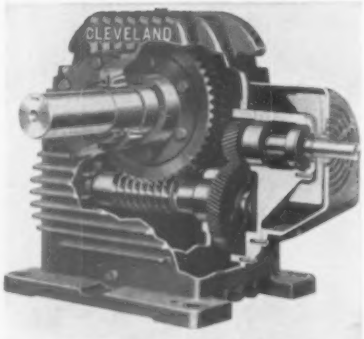
ASK NIAGARA MOHAWK

INVESTOR OWNED TAXPAYING

Begins on page 124

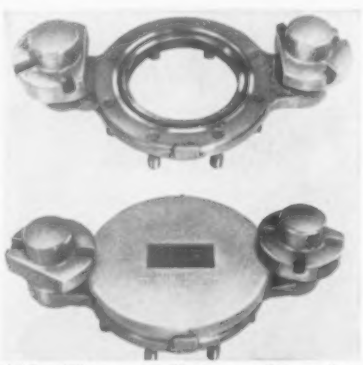
EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.



119—Speed reducer, with helical worm gear, comes in seven sizes with 4- to 12-in. center distances. Fan-cooled, 34:1 to 394:1 ratios; fractional ratings to 58.5 hp. Primary and secondary gears share oil bath, but have separate housings in smaller sizes. *Eaton Mfg. Co.*

120—A-C motor, in 200 to 2000 hp., is insulated against moisture, chemicals, oils, and abrasive contaminants for increased life. Both copper conductors and formed coils are coated. Comes in open, all-weatherproof models, frame sizes from 445U. *The Louis Allis Co.*



121—Hose coupling permits make-and-break in seconds with quick-acting cam. No nuts or bolts. Flanged flexible hose can be installed without lining up holes for bolts. For all liquid-carrying lines from 2 to 16 in. in diameter. Rated 450 psi. *Camlock Flange Sales Corp.*

Turn the page

The pace-setting combination that boosts production 20% —

Only

HYSTER® has it!

NEW HYSTER SPACESAVER cushion tire trucks of 6-7-8-10,000 lbs. capacity give you a combination of production features never before offered in *any* lift truck.

MONOTROL CONTROL—Completely foot controlled Hystamatic transmission—for easy, natural driver control; safe, rapid handling; highest production.

TWO-SPEED HOIST—Fully automatic system for fast lift with full load—double speed with partial loads.

FULL FLOW—FULL TIME HYDRAULIC FILTER—eliminates down-time caused by dirty hydraulic oil. Cuts maintenance costs.

Ask your Hyster dealer to demonstrate these and other exclusive features that set the engineering pace for *all* lift trucks. Call him soon or write for literature.

INDUSTRIAL TRUCK DIVISION—Lift trucks, mobile cranes, straddle carriers
TRACTOR EQUIPMENT DIVISION—Construction and logging equipment
MARTIN TRAILER DIVISION—Heavy machinery hauling trailers
INTERNATIONAL DIVISION—Overseas manufacturing, sales and service
Manufactured in: Portland, Oregon (Home Office) • Danville, Ill. • Peoria, Ill. • Kewanee, Ill.
Australia • Brazil • England • France • The Netherlands • Scotland • Union of South Africa

HYSTER COMPANY
INDUSTRIAL TRUCK DIVISION
P. O. Box 847 • Danville, Illinois

For more facts Circle 450 on Reader Service Card

BOSTON Gear® QUALITY

largest selection
14½° P.A. stock gears

From local stock – at factory prices
Spur, helical, worms and worm gears.
1781 types and sizes, from 48 to 3 pitch.
Brass, steel, iron, and non-metallic.
See Catalog 57 for complete listings.
IN STOCK at your nearby **DISTRIBUTOR**

BOSTON Gear®

© Boston Gear Works, 1961
Quincy 71, Mass.

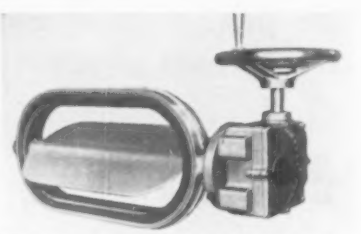
Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

122—Limit switch has neon indicator light that will go on or off at either position of switch arm. Completely sealed aluminum housing. Has ½-14 NPT threaded opening for conduit connection. Rated 10 amp., ½ hp. at 120 volts a-c. *Minneapolis-Honeywell Regulator Co.*

123—Low-voltage transformer can be used safely around machinery, and in damp buildings and on grounded locations to inspect tanks and boilers. Portable, weighs under 10 lb. Comes equipped with 6-ft. cord and with grounding plug cap for 125 volts a-c. *Ericson Mfg. Co.*

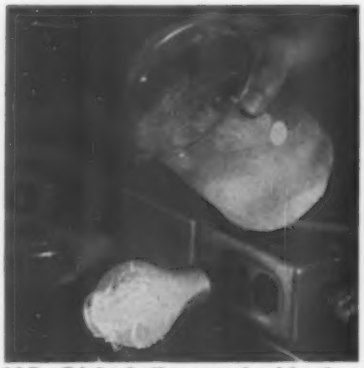


124—Butterfly valve, for rectangular and flat oval ducts of process-ventilation and air-conditioning systems, offer tight shutoff, occupies little space. Manual or automatic control. Replaceable liner. Dial shows position of disk. In 3x7 to 20x30 in. *W. S. Rockwell Co.*

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.



125—Light bulb wound with glass fiber yarn is shatterproof even though dropped on hard surface or immersed while hot in ice water. Flamescent casts glareless, flame-like glow. Lumen output higher than other processed bulbs. Comes in standard sizes. *Duro-Test Corp.*

126—Polyurethane caster wheels, Duro/Tred, outlast rubber or ordinary plastic. Resist abrasion, slippage, most acids, dry heat (to 250 F.), cold (to −90 F.). Roll smoothly, swivel easily. Capacity: 800 to 3500 lb. In 5- to 12-in. diameters. *Faultless Caster Corp.*

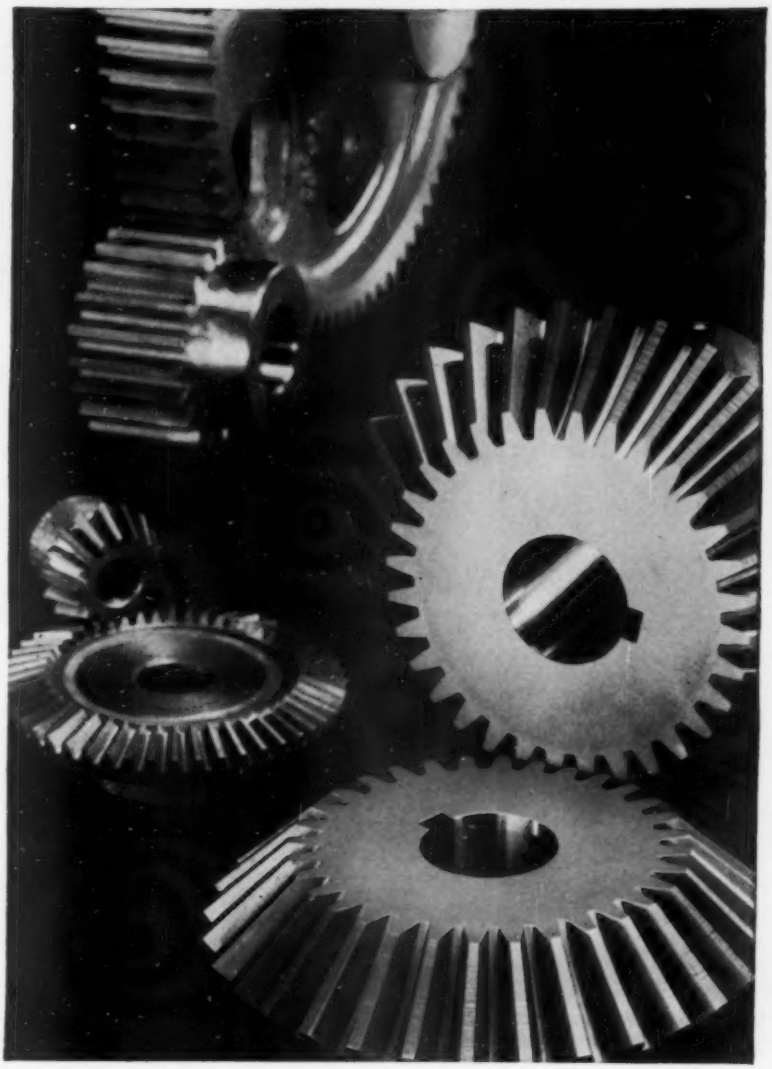
127—Gravity feeder for closed-head steel shipping containers can be set to feed from a drop to a stream at constant rate. Made of polyvinyl chloride and Teflon, resists all acids except fluorides. Micrometer-type flow control in 0.001-in. increments. *Norcross Companies.*

Turn to page 142

BOSTON Gear® QUALITY

largest selection

20° P.A. stock gears



Off-the-shelf delivery - from stock

at over 100 Distributors. Spur, bevel, miter.

782 types and sizes. 120 to 4 pitch.

Brass, steel, iron, and non-metallic.

Design around gears you can get today.

IN STOCK at your nearby **DISTRIBUTOR**

BOSTON Gear®

© Boston Gear Works, 1961
Quincy 71, Mass.

Purchasing Agent, "... purchasing fewer types of lubricants in greater volume lowers our costs."

Superintendent, "... simplifying anything, including lubrication, pays off in improved efficiency."

GULF MAKES THINGS RUN BETTER

These four men understand the real value of a simplified lubrication program. *Why?* Because a minimum number of lubricants makes their jobs a lot easier.

In some plants, Gulf engineers have found more than *three* times the number of lubes actually needed for efficient operation. This means three times as many ordering, billing, stocking and handling problems. And it also means three times as many chances for human errors.

Examples: One large electrical appliance manufacturer slashed lubricants from dozens to just 6. In addition, a well-known paper company pared lube brands from 39 to 13.

Here's what Gulf engineers can do for you: (1) they can relate their experiences with hundreds of lubricating problems to *your* specific needs, and (2) they can recommend these versatile Gulf® lubricants—Gulf Harmony® Oil, Gulfcrown® Grease

Plant Engineer, ". . . a simplified lube inventory means reduced paperwork, fewer handling and stocking problems."

Oiler, ". . . fewer lubes mean less chance for error, and I get the job done faster."

THROUGH SIMPLIFIED LUBRICATION

and Gulf E.P. Lubricants.

Perhaps there are opportunities in *your* plant for simplified lubrication. A Gulf Sales Engineer is available to help you find them. Contact him at your nearest Gulf office. Or, write today for pamphlets on Gulf multipurpose lubes.

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GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

Send me booklets on Gulf multipurpose lubricants.

Name_____

Company_____

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City_____ Zone____ State_____

For more facts Circle 453 on Reader Service Card

AT YOUR SERVICE FOR INDUSTRIAL POWER!

RCA THYRATRONS High- and low-power types for control of welding power sources, motors and other equipment.

RCA RECTIFIERS Vacuum, gas, and mercury-vapor types in a wide choice of power ratings for industrial uses.

RCA POWER TUBES For long, dependable heavy-duty service in electronic heating systems and similar applications.

RCA BEAM POWER TUBES For long-life and dependable performance in mobile and industrial two-way radio applications.

RCA PHOTOTUBES AND PHOTOCELLS For long-life and dependable performance in counting circuits and other light-actuated industrial equipment.

RCA PHOTOMULTIPLIERS For industrial and laboratory applications requiring extreme photo sensitivity and speed of response.

You take no chances when you replace with RCA industrial tubes. **Every single tube,** before leaving our plant, is aged and tested for major electrical characteristics. A tube failing a single test is automatically rejected and destroyed.

For additional information, call your RCA Industrial Tube Distributor.
RCA Electron Tube Division, Harrison, N. J.

The Most Trusted Name in Electronics
RADIO CORPORATION OF AMERICA

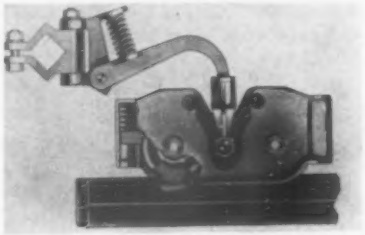
Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

128—Shoe cleaning unit uses six brushes to eliminate trapped dirt in shoes. For "white rooms" and quality control where dust and dirt are undesirable contaminants. Comes with various-type brushes and vacuum devices. Optional germicide spray. *Liberty Machine Co.*

129—Live roller conveyor prevents pile-up of cartons of mixed dimensions and weights. Reduces accumulation pressure to 3½% of weight. Once released accumulated packages move simultaneously on line. No gaps or lags. Available in seven widths. *Standard Conveyor Co.*



130—Trolley conductors and current collector system for cranes and monorail systems feature enclosures for maximum safety. Gard-Elex conductors reduce rolling friction and allow smooth, trouble-free transfers at interlocks and switches. *Consolidated Crane, Inc.*

Turn the page

AVAILABLE FOR IMMEDIATE DELIVERY FROM YOUR LOCAL STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE

INLAND®

INLAND STEEL COMPANY 30 W. Monroe St. - Chicago 3, Ill.

Something New from . . .

KALAMAZOO

Model 8CW-B1
Automatic Cut-off
Machine

$1,545.00
COMPLETE

If cutting costs and increasing production are most important to you, then the 8CW-B1 is the saw for you. Its low cost, completely automatic operation has been job tested and approved for accuracy and efficiency using low cost carbon steel blades.

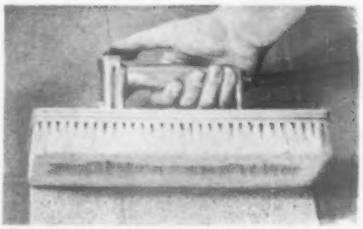
Write today for prices and literature or contact your local Authorized Kalamazoo Distributor.

MACHINE TOOL DIVISION
KALAMAZOO TANK and SILO COMPANY
661 Harrison Street • Kalamazoo, Michigan

Begins on page 124

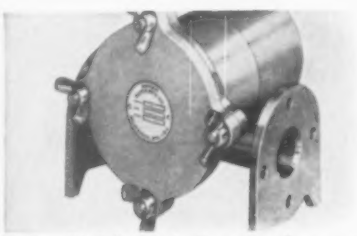
EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.



131—Brush-type trowel cleans rough surfaces, such as painted cinder blocks, bricks, and precast cement slabs. Thumb controls "fog spray" solution. Designed as an accessory to company's Wall-O-Matic wall-washing machines. Economical. *Central States Maintenance, Inc.*

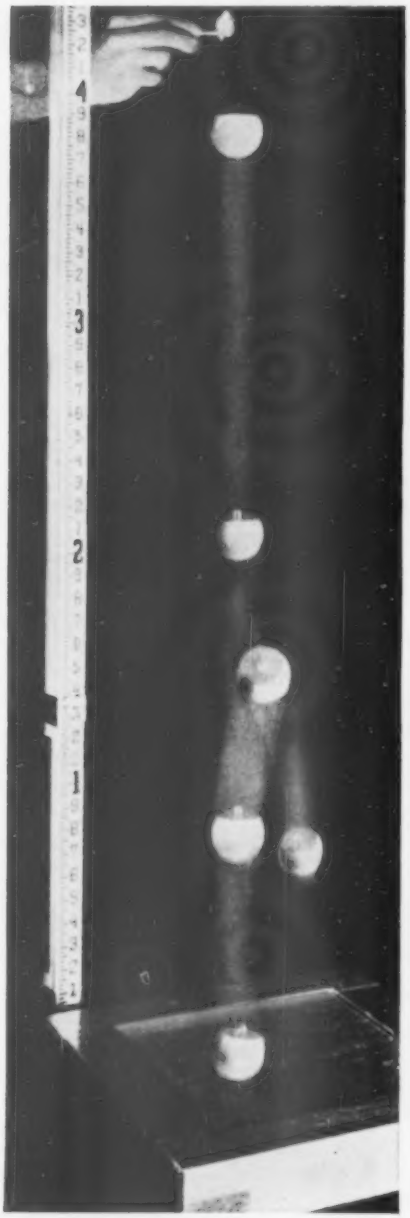
132—Wire clippers use air power to cut soldered portions of 14-gauge copper wire with little effort. Weighing 6 oz., Air Nips reduce operator fatigue associated with manual wire clipping. Operate with ¼-hp. compressor. Easy maintenance. *Chicago Pneumatic Tool Co.*



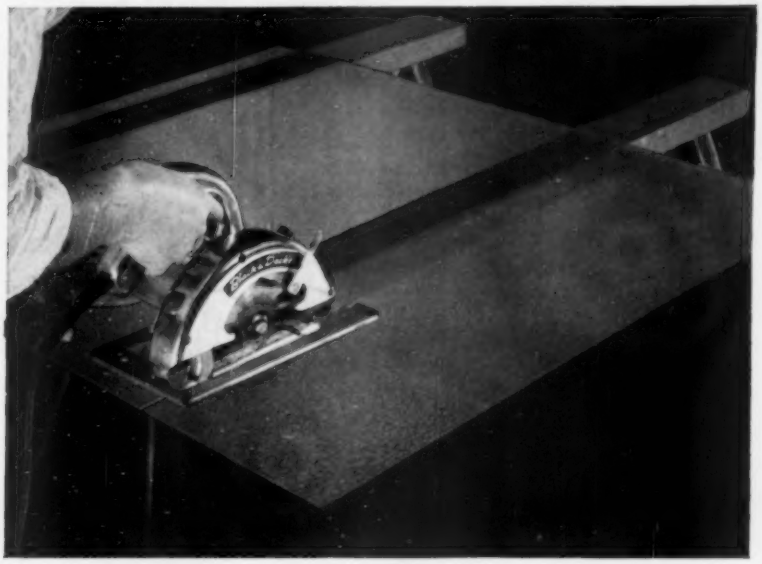
133—Stainless steel meter for corrosive liquids comes in 1- and 2-in. sizes with remote reading devices. Uses oscillating piston and magnetic drive, thus confining liquid to measuring chamber. No leaks to corrode the gear train. Precision accuracy. *Badger Meter Mfg. Co.*

Turn the page

The answer to a maintenance man's prayer ...Johns-Manville CORRULUX®



SHATTER-PROOF! When a 2½ inch steel ball weighing 2.06 lbs. was dropped from 4 feet, the ball bounced approximately 1½ feet—but did no damage to a Structural Grade Corrulux Flat Pane!



EASY TO WORK...EASY TO HANDLE. Cut special shapes and sizes with a power saw, hacksaw or handsaw. No tricks to learn; Corrulux drills and fastens readily. Light and easy to handle, Corrulux Flat Panes come in sizes that fit most windows. Replace glass with shatter-proof Corrulux!

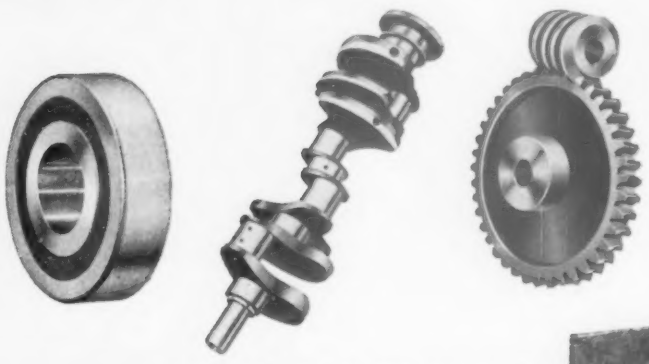
EASY TO INSTALL. End worries about window breakage forever! As easy to install as glass, yet protects against storm damage, vibration, vandalism and other hazards. Corrulux eliminates glare, spotlighting and harsh shadows . . . diffuses light at all angles. Corrulux admits over 80% of the light that strikes its surface, depending on color.

WHERE TO GET CORRULUX. Look for the finest translucent panel on the market—at an economical price—in the Yellow Pages under *Plastics*. Or write to Johns-Manville, Box 158, Dept. F661, New York 16, N. Y. In Canada, Plastics and Allied Building Products, Ltd., Dundas, Ont.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

VALVOLINE
Tectyl
PROTECTS METALS AGAINST RUST



There's a job for Valvoline Tectyl in your industry, protecting metal surfaces against rust and corrosion during shipping and storage.

Low-cost Tectyl rust preventives are widely used by the military services and by industry.

Tectyl's easy-to-apply, easy-to-remove film provides complete protection from the effects of snow, rain, salt air, humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications and there are more than 40 variations to meet every industrial need. *We suggest you write today for your copies of two helpful, detailed Tectyl charts which give industrial and government specifications and applications.*

VALVOLINE Tectyl RUST PREVENTIVES

VALVOLINE OIL COMPANY
Division of Ashland Oil & Refining Company
Refinery — Freedom, Pennsylvania • Home Office — Ashland, Kentucky

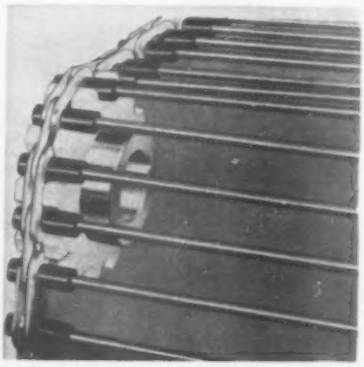
Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

134—Vibratory feeder has its own 1½-cu.-ft. hopper to move up to 6000 lb. of dry bulk material per hour. Accurate flow control is maintained by adjusting air supply. Stops or starts instantly by manual or solenoid valve. Good for dusty powders. *Cleveland Vibrator Co.*

135—Rayoscan signals alarm before potential hot spot on shell of rotary kiln requires equipment shutdown. Easy-to-install "pivoting" pyrometer system continuously monitors and records—quickly spots location, and rate of change in temperature. *Leeds & Northup Co.*



136—Nylon-rod conveyor belting requires no lubrication; can be used on runs up to 150 feet with a single drive. Speeds up to 850 fpm. with perfect alignment. Meets rigid sanitary specifications. Guaranteed for 5 years with normal usage. *Velten & Pulver, Inc.*

Turn the page

"We pocket the difference"

The difference? Saving in floor space. No foundation cost. Quick and easy installation. The Gardner-Denver packaged air compressor goes right to work . . . provides a dependable supply of air for years. Want details? Request Bulletin WB-10.

Gardner-Denver Company, Quincy, Illinois—Offices in principal U.S., Canadian and Mexican cities
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario
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EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Using the positive
gas mask principle
ACTIVATED CHARCOAL
is the most versatile
air purifier.
Barnebey-Cheney is the only
manufacturer of ALL types of
activated charcoal filters.
Activated charcoal
is our business.
We can make it work for you.

	standard designs	special designs	custom designs
Home appliance filters	✔	✔	✔
Commercial filters	✔	✔	✔
Home filters	✔	✔	✔
Self-contained units	✔	✔	✔

Ask for literature T-366. Send us your problem to solve.
Barnebey-Cheney, Columbus 19, Ohio.

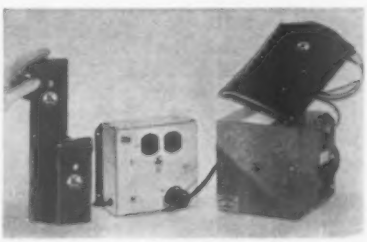
Barnebey
Cheney

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

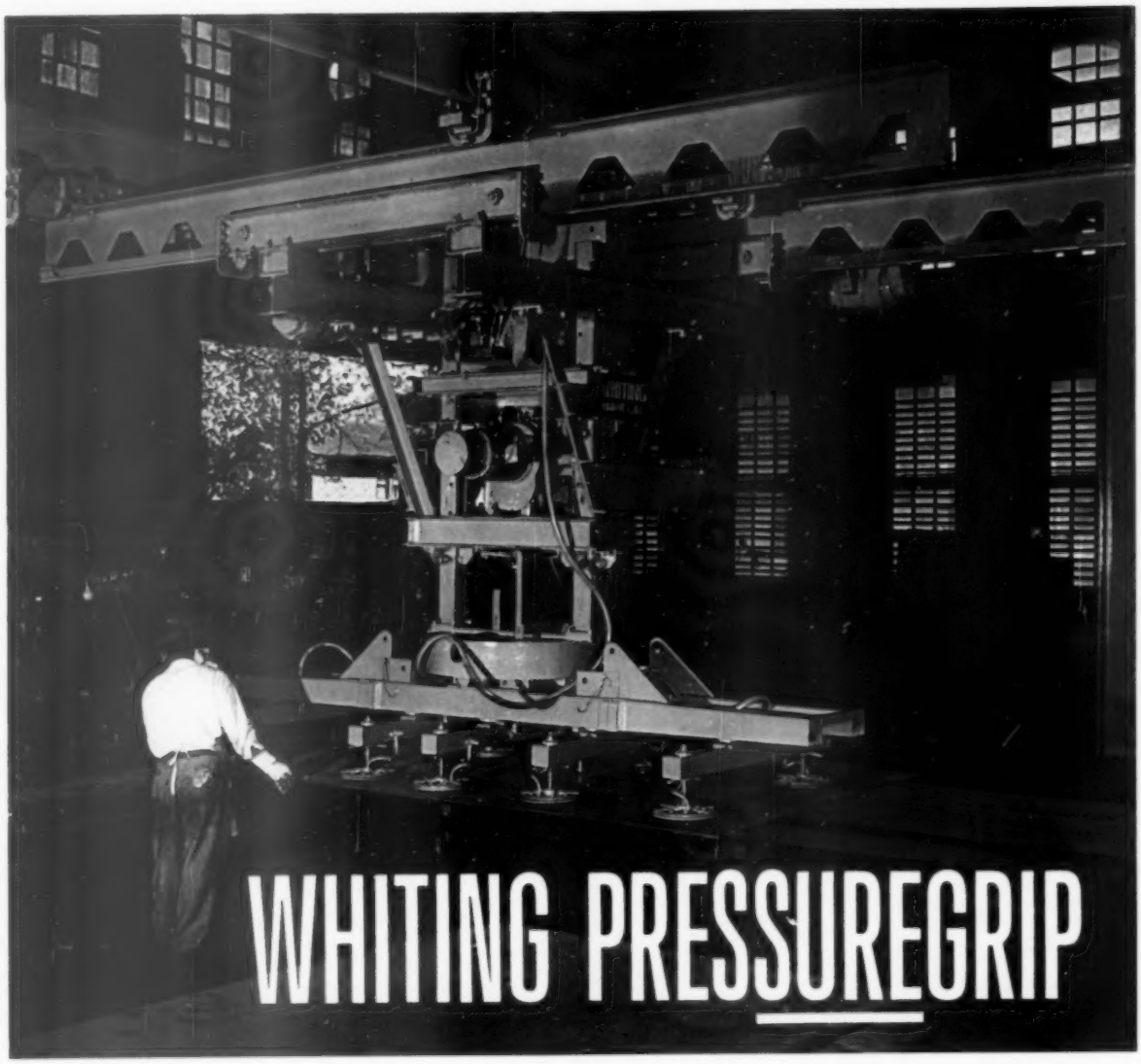
137—Cut-off saw makes straight, bevel, or miter cuts without coolants. Special tooth shape, semi-milling action, and high-torque combine to move blade through stock so fast that heat is not absorbed. Saw, not table, re-sets to change cutting. *Production Machinery, Inc.*



138—Pocket-size alarm for plant guards uses miniature transmitter (left) to signal fixed receiving unit. Alarm sounds locally, remotely, or at central station. Also controls lights and other electrical equipment. Range up to 120 ft. *Walter Kidde & Co., Inc.*

139—Wire stripper works like pliers to remove insulation from stranded and solid wire. Single squeeze is enough—there's no nicking of wire. Available in three sizes for 22-10, 18-10, or 14-8 wire. Blades are removable for sharpening. *Holub Industries, Inc.*

Turn to page 153



THIS HEAVY STEEL PLATE IS RIDING ON AIR

Reducing large sections of steel plate to the proper sizes required for rail car building used to be a problem job at Pullman-Standard. Now it's a breeze. It's automatic and it's done with air. That's right, air. Whiting Pressuregrip now picks up the plate as shown above and feeds it into a 12 foot shearing machine.

Pressuregrip uses vacuum to handle materials of all kinds—wood, glass, plastic, all types of metals.

Eight vacuum grippers are used in the system above, but for many machine loading applications, one gripper will do. We call that one Uni-grip.

Let us help you cut your materials handling costs with Pressuregrip. Write Whiting Corporation, 15665 Lathrop Ave., Harvey, Illinois.

WRITE FOR the facts on the Pressuregrip installation above—Bulletin V-102.

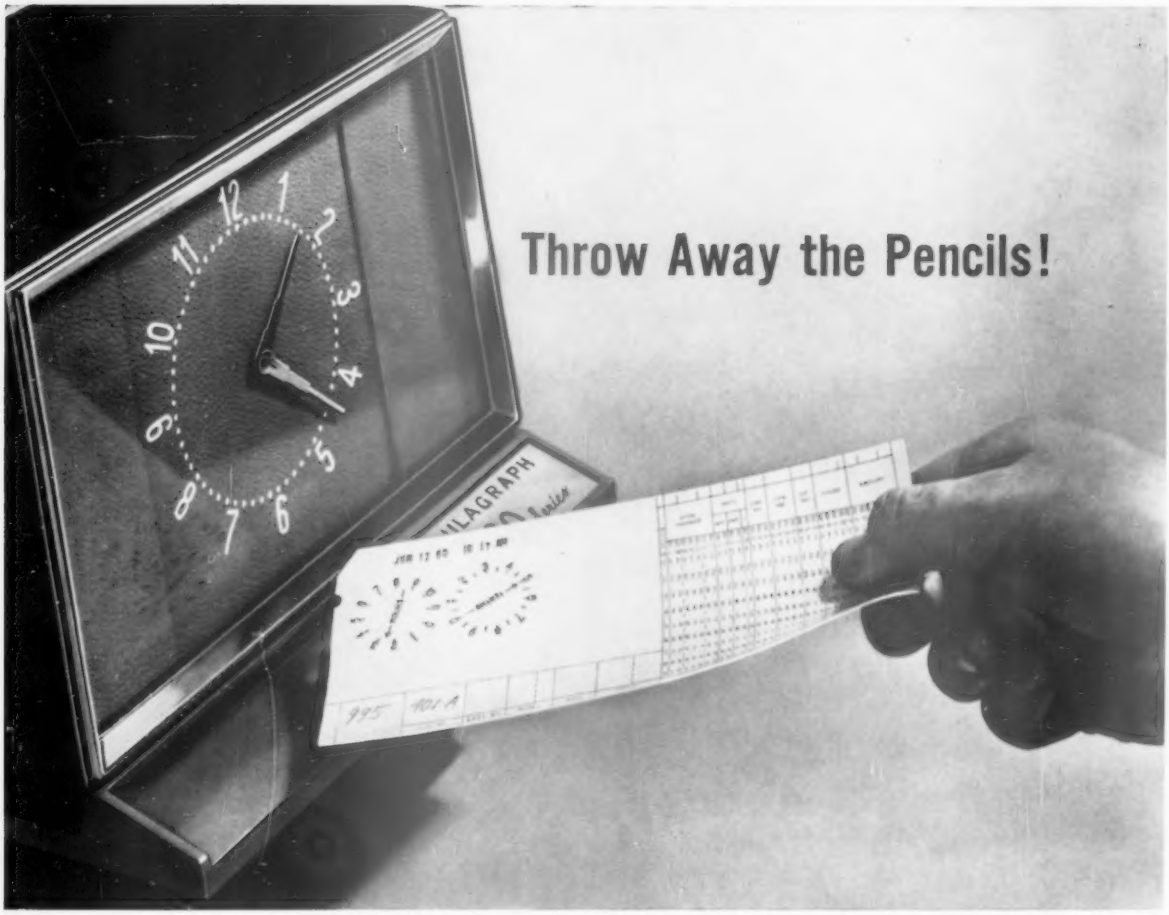
See our catalog in Sweets

90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

PRESSUREGRIP

WHITING

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL PROCESSING EQUIPMENT



Calculagraph 500 Series automatically computes actual labor time — eliminates error-ridden manual methods.

Your data collection system can be greatly simplified and attain greater accuracy with the new 500 Series Calculagraph because this completely new computing time recorder, based on the time-tested Calculagraph principle, computes as well as prints the actual time worked on any given production job. There are no complicated levers or buttons to set. The 500 Series makes the decisions. Production workers merely insert job cards at the "start" and "finish" of the job. The 500 Series does the rest. The actual time worked, with nonworking periods automatically deducted, is printed on the job card and ready for processing.

The 500 Series dovetails easily with any internal data processing system or outside service center. In smaller systems where the volume does not justify the use of machine accounting, this new computing time recorder can be a system in itself.

Investigate this new 500 Series now. Write or call for more details and, if possible, send us samples of your job cards for analysis.

INDUSTRIAL DIVISION

CALCULAGRAPH *Company*

273 Ridgedale Avenue, Hanover, New Jersey

For more facts circle 462 on Reader Service Card

Circle 463 on Reader Service Card for items on next page

JANITROL

presents the new and versatile

52 series

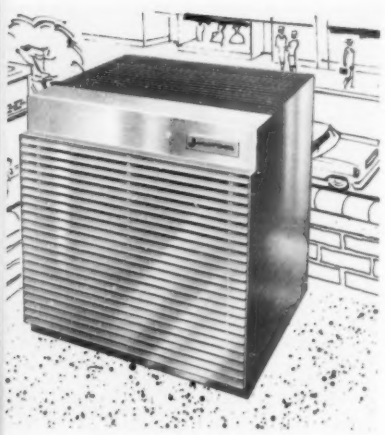
AIR-COOLED AIR-CONDITIONER

A PRACTICAL APPROACH TO ECONOMICAL, HIGH EFFICIENCY COOLING FOR COMMERCIAL—INDUSTRIAL BUILDINGS . . .

advance designed for the sixties

NEW JANITROL 52 SERIES AIR COOLED AIR CONDITIONERS

Outwardly beautiful and pleasing to the eye, inwardly rugged and powerful, new Janitrol 52 Series units combine years-ahead styling and cooling performance . . . provide truly low-cost central cooling with matchless reliability and performance.



JANITROL'S ADVANCED DESIGN . . . A SAFEGUARD AGAINST PRODUCT OBSOLESCENCE!

The weatherproof, high-efficiency 52 Series condensing unit, containing all moving refrigeration parts, installs outside. Available in six basic capacities from 22,200 to 110,200 btu/hr.

Full A.R.I. certification: Every Janitrol unit meets all standards of Air Conditioning and Refrigeration Institute.

STANDARDS OF EXCELLENCE . . .

In Performance—large condensing coils assure efficient operation with outdoor temperatures up to 125°F!

In Styling—crisp, modern lines distinguish the new 52 Series. Cabinets are finished in durable, automotive-type enamel.

In Economy—The top-mounted fan bathes condensing coils in a jet stream of cooling air to raise efficiency and reduce current usage. Coils are shaded from the sun by louvers.

In Quietness—The powerful compressor is mounted on rubber-cushioned, resilient springs . . . cabinet is heated with special sound-deadening material.

In Safety—Complete overload and weather protection is provided. Enclosing grilles thoroughly safeguard children and pets.

In Servicing Ease—all components are easily accessible. Service panels can be removed without effecting operation during service checks.

MULTIPLE COMBINATIONS PROVIDE ECONOMICAL, HIGH CAPACITY COOLING

Modular cabinet design and upflow exhaust permit compact, multi-unit installations. Only the grilled, air-intake side of the cabinet requires clearance.

Any desired number of Janitrol 52 Series units may be installed together, with zero clearance between, to provide a variety of higher capacity combinations from 120,000 to over 1,000,000 btu/hr. Only Janitrol offers custom-built capacities at standard model cost!

JANITROL®
HEATING AND AIR CONDITIONING

M-R MIDLAND-ROSS CORP.

A DIVISION OF MIDLAND-ROSS CORP. • COLUMBUS 16, OHIO
IN CANADA: MOFFAT HEATING & AIR CONDITIONING DIVISION
MOFFATS LTD., TORONTO 15

ALSO MAKERS OF SURFACE INDUSTRIAL FURNACES, KATHABAR HUMIDITY CONDITIONING, JANITROL RESIDENTIAL HEATING AND COOLING EQUIPMENT

JANITROL
year 'round conditioner

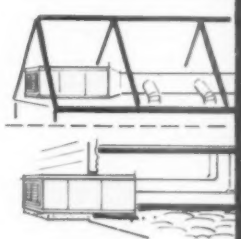
Combines quality gas heating and waterless cooling! Less than four sq. ft. of floor space needed for most installations. Features include famous Dura-Tube heat exchanger with 20-year warranty. Unique by-pass for correct air flow on heating or cooling cycle without adjustments. Powerful air-cooled 52 Series condensing unit. ADD-ON cooling—install for heating only, add cooling later.

ADD-ON COOLING

Adapts most any warm air furnace for thrifty, efficient central cooling. Cooling coil mounts in duct, attractive, air-cooled 52 Series unit goes outside. Powerful, quiet performance with outside temperatures to 125°F. Easy to install.

"J-LINE" self-contained conditioners

An economical solution for many cooling needs. One compact unit contains blower, compressor and coils. For use with ducts or as free discharge. Install through wall in crawl space, attic or other limited access locations.



BLOWER-COIL UNITS

Smartly styled cabinet contains cooling coil and blower for use as free discharge or with ducts. Units are attached to ceiling to save floor space. Very quiet and efficient!

GAS-FIRED DUCT FURNACES

For installation in a duct where the air is circulated by a separate blower. Especially adaptable for industrial heating applications in combination with cooling. 73 Series in six sizes from 50,000 to 225,000 btu/hr. 72 Series in sizes 200,000 and 300,000 btu/hr. may be combined to provide unlimited capacity range.

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

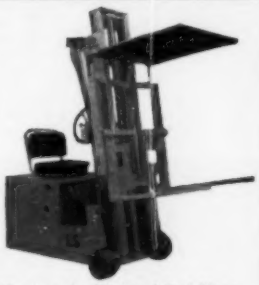
140—Spiral feeder raises metal parts from cleaning and degreasing tanks, or stampings from presses to tote boxes, to a height of 20 ft. Rotary type, operates on 230 or 460 volts, 3-phase a-c. Low-cost, efficient convection or forced-air cooling. Three models. *Syntron Co.*

141—Power converter changes conventional grinder to precision electrolytic grinding unit. Increases grinding speeds, reduces diamond and aluminum oxide wheel costs. Simple controls adjust to specific job. Five models, 250- to 1500-amp. capacities. *Hi-Carb Corp.*

142—Rising blocks of cast iron eliminates costly maintenance of cross supports on flame-cutting tables. Bee-hived shaped blocks fit onto cross supports holding steel plate clear of table, thus preventing flame from damaging table bed. *Brown & Sharpe Mfg. Co.*

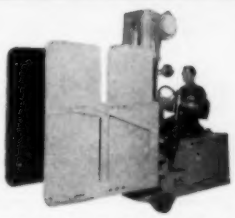
Turn the page

New Dimensions in Versatility and Economy

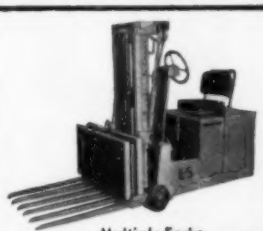


Equipped with Load Stabilizer for bottled and case goods.

Revolving Paper Roll Grab handles large heavy rolls.



High-friction Grab Arms adapt Model H for large cartons.



Multiple Forks, Push-Off, and Side Shifter for palletless handling.

L-S® MODEL H SPACEMASTER®

Most adaptable 2000 lbs. capacity truck for the widest variety of needs. Adapts *perfectly* to handling of pallets, skids, barrels, bales, cartons, rolls, or whatever. Excellent weight distribution with a low center of gravity and light operating weight also make it ideal for between-floor elevator work. And a 56" turning radius permits right angle stacking of 40" long pallets in 9' aisles with room to spare.

With a heavy duty 24 volt electric system, it's a proven work horse in many companies. Economical to own and operate, the Model H is your best all-electric truck value. Its low chassis price will surprise you. And its low cost maintenance will save you $200 to $300 a year over a comparable gas or LPG truck.

Top quality throughout: high pressure hydraulic system, rugged "I" beam mast, lubricated-for-life construction and all-welded chassis. Easy to handle and operate, the operator's seat is only 34¾" high for fast mounting and dismounting. Hydraulic-electric system is so efficient, a wide range of attachments can be installed to meet every handling need.

Write today for Circular 37A and "trucks in action" bulletins on the versatile Model H SpaceMaster.

L-S LEWIS-SHEPARD®

156 Walnut Street — Watertown 72, Mass.

The MASTER® Line — The COMPLETE Line of Materials Handling Equipment

How to up-date weighing methods

and prevent erosion of profits

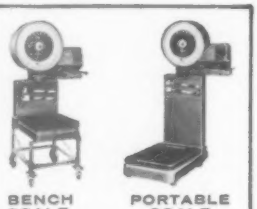
PRINTWEIGH® RECORDS

leave nothing to chance, guesswork or "memory"

Complete, accurate, *printed* weight records at your fingertips! That's what you get when you have Toledo Printweigh "400" at work for you. Printweigh is the modern way to satisfy your need for weight records that assure tight control of costs, quality, inventories and customer billing.

With Printweigh, you'll never again be plagued by human errors in reading, remembering and recording weights. You'll enjoy new flexibility and efficiency in weighing, too. Printweigh gives you weight records in fully identified figures on tickets, strips, sheets or labels. It will transmit weight data electrically for recording on remote office machines. Printweigh Scales are offered in a full range of industrial types and capacities.

Remember . . . materials become money on your scales. Losses lurk in inaccurate, incomplete weight records. You need Printweigh to guard costs and quality, eliminate profit-stealing weighing errors. Ask your Toledo representative for full details on Printweigh, or WRITE FOR BULLETIN 2017 TODAY. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.
(Toledo Scale Co. of Canada, Ltd., Windsor, Ont.)



Toledo Printweigh Scales are available in a full range of models, including Built-in Hopper, Tank, Overhead Track and Motor Truck Scales, in addition to the models shown above.

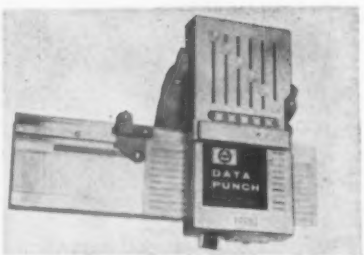
SERVICE Factory-Trained 240 Cities

TOLEDO® *Headquarters for Weighing Systems*

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

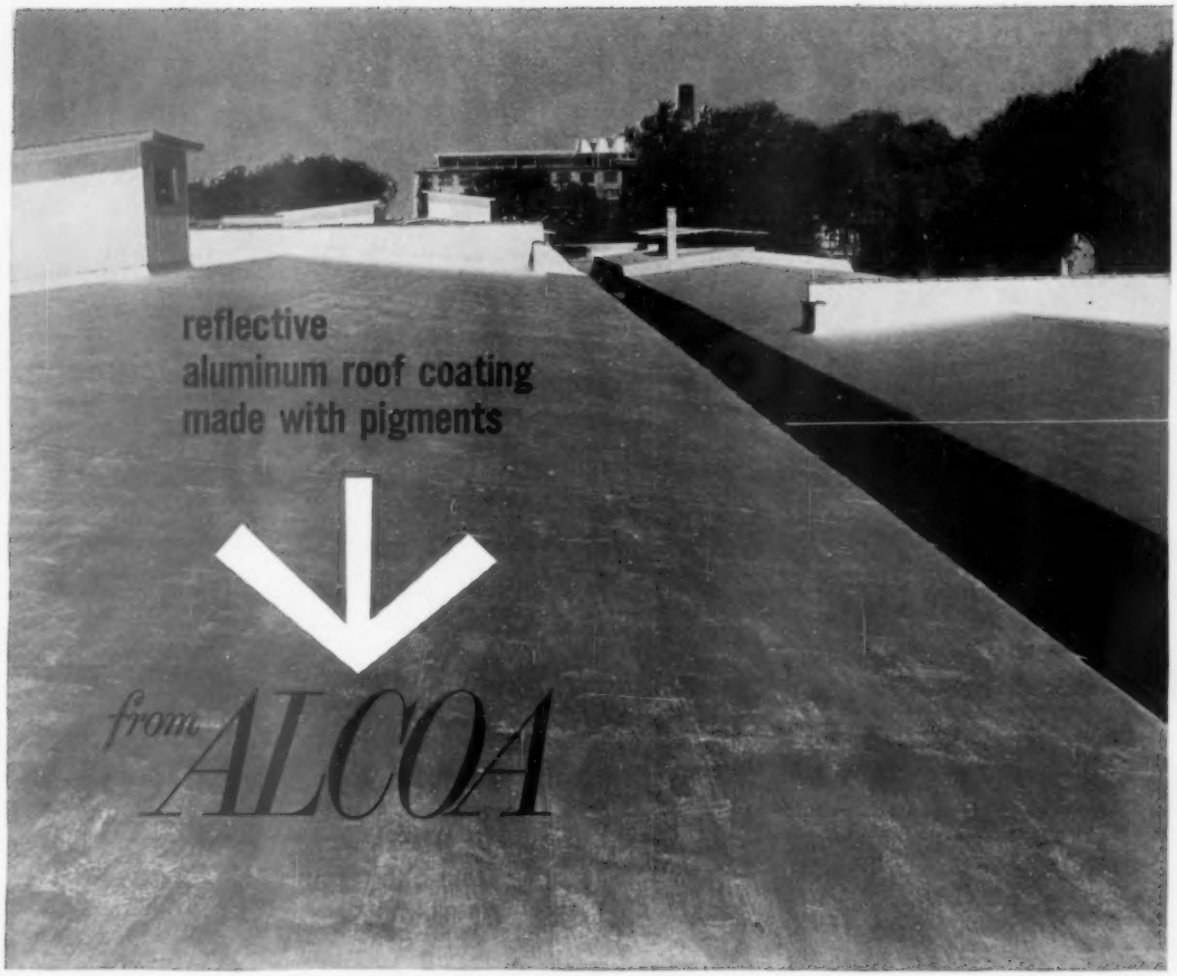


143—Portable data punch, weighing 2½ lb., records data in standard punched card code on tabulating card. Card can then be fed directly to any data processing system without transcription or added preparation. Reduces punching time, errors. *Addressograph-Multigraph Corp.*

144—Cable and hose protector is a zipper-closing neoprene-coated sleeve. Comes in 9-in., 12½-in., and 25-ft. lengths to fit standard cable sizes. Protects from damage caused by falling objects, trucks, and normal deterioration. Easy to apply. *Singer Glove Mfg. Co.*

145—Variable speed drive uses silicon diodes and saturable reactors to convert a-c to controllable d-c. Static-powered Statatron comes in 1 to 200 hp. Compact—no motor generator, low maintenance. Offers vibrationless operation. *Reliance Electric & Engineering Co.*

146—Paging system can be used as loud speaker or as semi-private telephone. Pages with handset in place; lifting it transforms unit into telephone. Two-conductor wire connects pagers. Transmits to 10 miles over existing phone lines. *Mine Safety Appliance Co.*



Warehouse owners praise TENKOTE Aluminum Coating

Paine Art Center, Oshkosh, Wis., first applied Tenkote Aluminum Roof Coating eight years ago on its extensive warehouses. The picture above was taken recently after the first recoating. The owners state that Tenkote is now a permanent part of their regular maintenance program.

George P. Nevitt, acting director, writes, "We used Tenkote on a small scale at first, and found it so satisfactory that we have now applied it on all warehouses owned by the Paine Art Center. It has been entirely satisfactory, protecting the warehouse contents from moisture."

Made by American Asbestos Products Co., Cleveland, Ohio, Tenkote combines pure ALCOA® Aluminum flakes in a tough asphalt-asbestos base. Preferred protection today on hundreds of public and industrial buildings, aluminum coatings like Tenkote provide a moistureproof shield that won't sag in summer or crack in winter.

Interiors are more comfortable in hot weather because reflective aluminum pigment turns back much of the sun's heat. Applied with ordinary roofing brush, these coatings come ready mixed; require no thinning or heating.

ALCOA does not make roof coatings, but we will be happy to refer you to reputable manufacturers who do. If you wish more information, please send the coupon for our informative booklets.

ALCOA ALUMINUM

PIGMENTS, PASTES & POWDERS

Aluminum Company of America
1750-F Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

☐ *Painting With Aluminum*
☐ *Aluminum Roof Coatings Make Time Stand Still*

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts Circle 466 on Reader Service Card

LINK-BELT conveyors

The last word in value from the first name in conveyors

CHAIN CONVEYORS—Carry the load directly on chain or drag bulk materials along a trough. Link-Belt builds a variety of chain conveyors with single or multiple strands . . . for light to extremely heavy-duty applications . . . for routes a few feet to hundreds of feet long. This conveyor unloads skids of bagged material from trucks, through weighing and to storage.

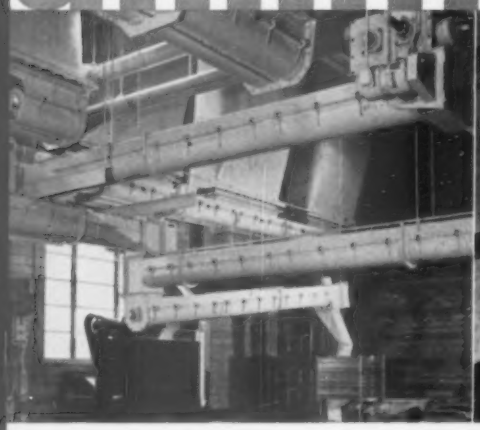
When it comes to your materials handling needs, it is a matter of sound economics to depend on Link-Belt, builders of industry's most complete conveyor line. In addition to this broad range of line, which permits unbiased recommendations, Link-Belt offers *quality*—achieved through engineering skills, manufacturing scope and research . . . *"experience unlimited"* in the materials handling field.

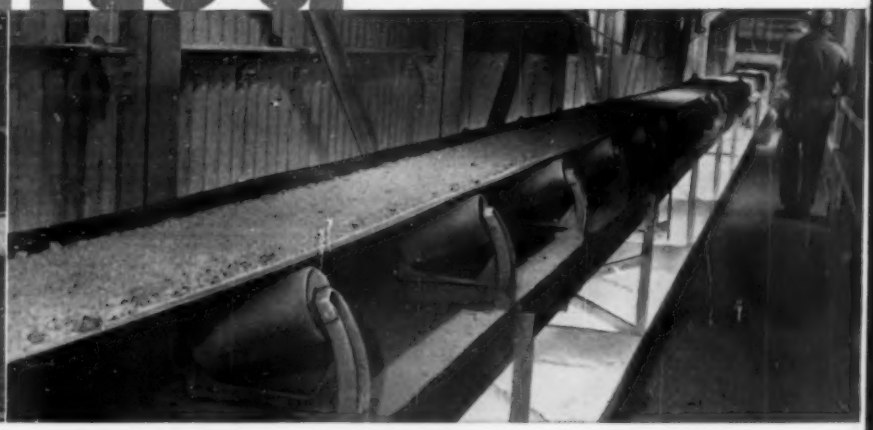
Also important, Link-Belt can provide *complete* handling systems . . . patterned exactly to your requirements with a background of more than 80 years of conveyor specialization. Our engineers are familiar with the particular handling needs of every industry. It's more than likely they have met—and solved—many problems similar to yours. We will design, equip and erect your entire installation . . . and accept full responsibility for its successful operation.

For full information—on single components or complete systems—large or small—contact your nearest Link-Belt office. Catalogs covering all conveyors are available on request.

unlimited

The line that means savings, whether handling parts or bulk materials, finished products or units



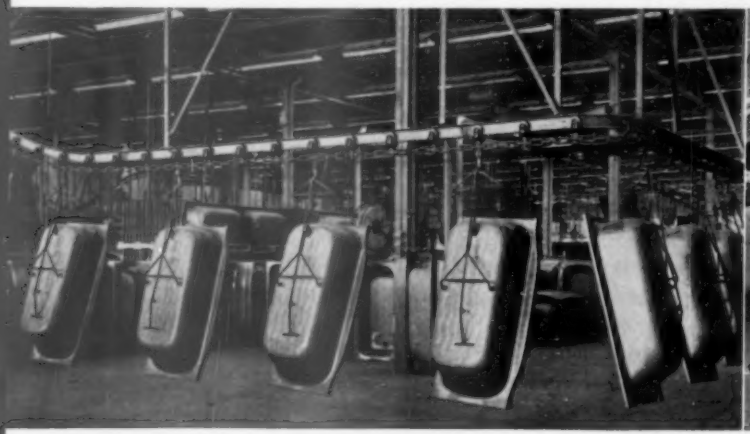


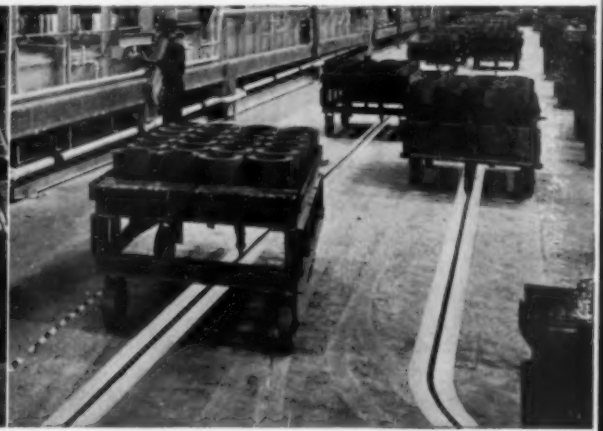
SCREW CONVEYORS—Easily adapted to congested locations . . . operate horizontally, vertically or inclined. Link-Belt provides all components for a complete screw conveyor line. Exclusive optional *Quik-Link* feature permits fast, easy removal of any conveyor section without disturbing other components.

BELT CONVEYORS—Link-Belt serves as a single source for design, equipment and erection of *Job-Engineered* belt conveyors for small or large tonnages, for routes of any length. Link-Belt engineers have the selection advantage of industry's most comprehensive idler line—plus a broad range of pulleys, drives, terminal machinery and auxiliary equipment. Husky, *Pre-Bilt* sectional belt conveyors are also available.

TROLLEY CONVEYORS—Link-Belt can provide systems to carry items of all sizes and shapes . . . to travel any path. Handling individual components or finished products, trolley conveyors or power-and-free trolley conveyor systems provide straightline production for operations separated by a few hundred feet or several miles.

TRUKVEYORS—Provide fast, orderly movement of materials on four-wheel platform trucks or dollies. They speed receiving, manufacturing and processing, sorting, storing, shipping . . . reduce physical effort. These versatile units accommodate changes in floor elevation, execute horizontal turns, permit easy disengagement of trucks at any point.





LINK-BELT

CONVEYING AND ELEVATING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15.034

Keeping production on the move in every industry

Apron conveyors
Arm and tray elevators
Belt conveyors
Bucket elevators
Bucket elevators-conveyors
Bulk-Flo
Car-type conveyors
Chain conveyors
Circular carrier conveyors
Drag conveyors
Flight conveyors
Flite-Flo conveyors
Oscillating conveyors
Power-and-free conveyors
Pusher chain conveyors
Scraper conveyors
Screw conveyors
Sidekar-Karrier conveyors
Skip hoists
Slat conveyors
Trolley conveyors
Trukveyors

IDEAS OF THE MONTH

By Lewis K. Urquhart, Consulting Editor, FACTORY

For more data, circle item numbers on Reader Service Card next to back cover.

Satisfying the Salaried Employee is packaged do-it-yourself plan (*National Assn. of Manufacturers*) that pinpoints areas of dissatisfaction, offers solutions to problems of status and recognition, compensation, communications, supervision. Can be presented without prior training. **(236)**

Bump Cap is protective headpiece (*Mine Safety Appliances*) for use in areas where there's no falling objects hazard. Weighs less than 7 oz. **(237)**

Top 'n Patch is floor topping and patching compound (*Fibre Glass-Evercoat*) that contains epoxy resin (nuf ced). Non-skid, practically indestructible surface resists chemicals, solvents, extreme temperatures. **(238)**

Booklet of the Month: PM addicts will want to add "Preventive Maintenance and Cost Control" to their working libraries. This general information manual (*International Business Machines*) discusses one data-processing application for effectively controlling maintenance of physical equipment. Application can be used in *any* industry for *any* type of equipment. **(239)**

Plant safety kit (*Towmotor*) designed to make better drivers out of forklift truck operators is offered again. Kit contains operator's guide, cartoons for bulletin boards, route posters cautioning operators on narrow aisles, blind corners, dangerous crossings, low headroom areas. **(240)**

Extra long gauntlets (*Goodrich*) are designed so wrists can be turned back to catch acid drippings. Smooth or rough-textured fingers. **(241)**

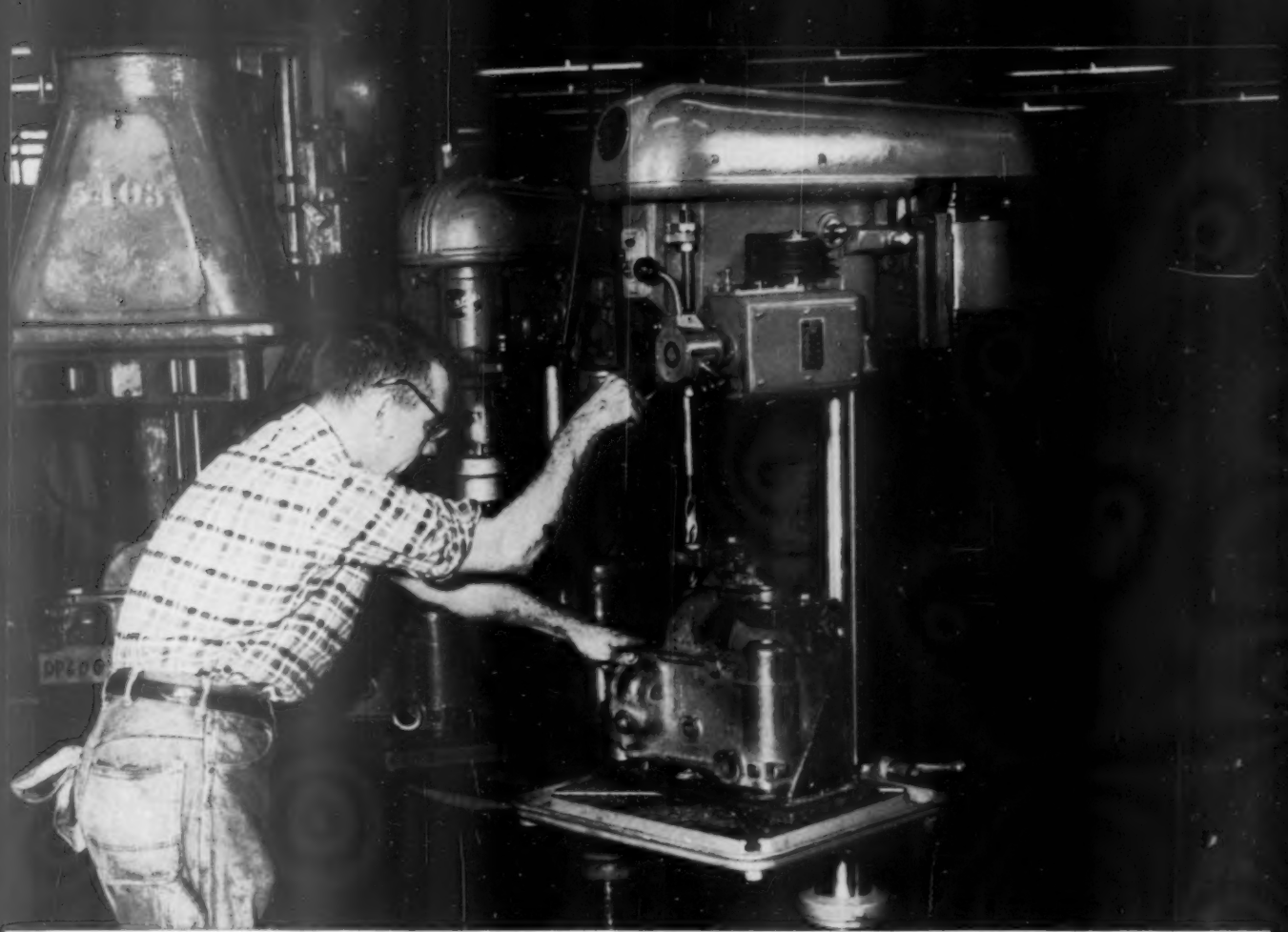
If in-plant feeding is on your docket, see 32-page brochure (*Blaikie Miller & Hines*) which defines science of food management, describes basic food service methods, presents case for using food management organization. **(242)**

Cordless electric drill powered by rechargeable power cells (*Black & Decker*) sounds like a handy-dandy tool to have around. Will drive 30,000 ½-in. holes in ¾-in. fir before cell replacement is necessary. **(243)**

Vacation Countdown is 8-page brochure (*National Safety Council*). Made to order for off-the-job safety programs, it suggests ways to make trip safe, emphasizes water safety and dangers of over-exertion, includes notes for do-it-yourselfers who spend vacations around house. Sample copy free. **(244)**

Twenty suggestions for better dictation. Brochure (*Sound-Scriber*) also lists six ways to more effective written communications. **(245)**

Turn the page



2600 rpm or 110 rpm—you can do more with a Delta 20" *geared pulley head* drill press

All you have to do is turn a key to change from direct belt drive to gear drive on any one of the 28 models of this machine. The 20" geared pulley head drill presses can be used in manual as well as semi and fully automated set-ups to meet a variety of production needs.

FREE BROCHURE describes complete line of 20" drill presses in floor, bench, multiple spindle and overhead models. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 628F N. Lexington Ave., Pittsburgh 8, Pa.

You can drill and tap large holes, do spot facing, reaming and counter-boring at extra slow speeds because these drill presses have planetary gear spindle pulleys which reduce spindle speeds and multiply torque. Hand feed models offer ten speeds, five in direct drive and five in gear drive, while eight speeds are standard on power feed models. Use of a longer than standard belt adds eight more speed selections to either model.

These rugged flexible drill presses have the capacity to handle production metalworking jobs done by machines costing more than twice as much! See them in action and learn how they can help you cut drilling costs and improve drilling quality. Your Delta Industrial Distributor (listed under TOOLS or MACHINE TOOLS in the Yellow Pages) will give you the facts and figures.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

For more facts Circle 468 on Reader Service Card

For more data, circle item numbers on Reader Service Card next to back cover.

For blackout protection, newest emergency lighting unit (*Exide*) will illuminate 10,000 to 25,000 sq. ft. for 3 to 8 hours (depending on number of lamps employed). Battery-powered unit not only operates instantaneously when normal power fails, but also automatically recharges itself. **(246)**

Stringless tags (*Dennison*) for production or inventory control have it all over the o.f. kind you have to tie on. Stripe of self-sticking adhesive on back of tag not only cuts down tag-attaching time, but also enables you to tag things heretofore difficult or impossible to tag. **(247)**

Fluorescent vests (*Pendergast*) of flame-red vinyl-coated nylon are for men who work in places where seeing them is essential to safety. **(248)**

Press-feeding magnets (*Magni-Power*) have no moving parts, utilize fixed cam plate that allows contact to be broken while holding steel in place. For handling blanks, stampings, formed steel parts up to 10 lb. **(249)**

Deadly Reckoning is full of accident facts and figures that will beef up your off-the-plant safety program. It's a 30-page report (*The Travelers*) of what happened on streets and highways in 1960. Nothing in it is copyrighted. Cartoons may be reproduced without let or hindrance. **(250)**

Low-cost snap-around tester (*Pyramid*) measures voltage, amperage, resistance without interrupting service (jaws snap around conductor). **(251)**

Computer characteristics chart (*Adams Associates*) we told you about last November has been revised, will be revised again in June and quarterly thereafter. Current revision lists salient facts of 55 general-purpose U.S.-built systems. Available at subscriber's option as pocket-size, plastic-bound booklet or as set of 8½x11 sheets for wall or desk use. **(252)**

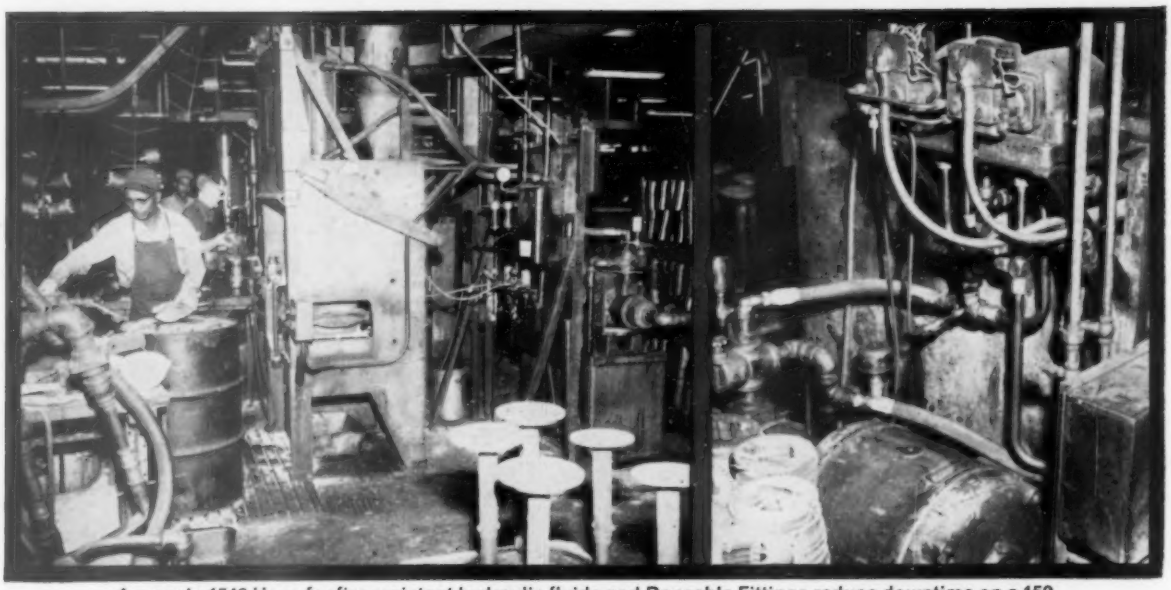
Iced tea, anyone? Handsome urn (*Blickman*) of gleaming stainless steel and Pyrex glass beats old enameled pitcher, makes it difficult for cafeteria patrons to say "no" to this hot-weather refresher. **(253)**

Air impact wrench (*Thor*) gives controllable torque delivery through oscillating impact mechanism, eliminating chipping and breaking down of hammer and anvil surfaces as result of partial engagement impact blows. **(254)**

Miniature voice amplifier (*Chemprint*) restores voice of gas-mask wearer to normal volume and intelligibility. No muffling effect. **(255)**

Measure material handling with the aid of seven ratios developed by expert James Bright. Inspired by the need to train handling analysts, these easy-to-use formulas are now in one hard-cover book (*Yale & Towne*). They'll help you find cost leaks and boost productivity and profits. **(256)**

Turn the page



Aeroquip 1546 Hose for fire resistant hydraulic fluids and Reusable Fittings reduce downtime on a 150 ton die casting press used by Emerson Electric Manufacturing Company to cast aluminum parts.

Aeroquip Flexible Hose Lines and Reusable Fittings Reduce Die Casting Maintenance Costs

...reports the Emerson Electric Manufacturing Company, St. Louis, Missouri

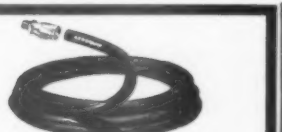
Emerson Electric found rigid pipe caused many hydraulic system leakage problems under constant vibration and high surge pressure peaks on die casting equipment.

Installations of Aeroquip 1546 Multiple Wire Braid Hose and Reusable Fittings for fire resistant hydraulic fluids (phosphate ester type), have performed reliably on Emerson's aluminum die casting press for more than two years; substantially reducing maintenance and replacement costs.

This die casting equipment operates daily, producing aluminum castings through two eight hour shifts. It is now functioning at peak efficiency without a sign of hose line failure even though these Aeroquip Hose Lines have been subjected to steady vibration and well over a million peak pressure surges during their long service.

Aeroquip Hose and Reusable Fittings provide dependable production performance under the most strenuous operating conditions. There is a combination of Aeroquip Hose and Reusable Fittings to exactly meet your job requirements. . . save time, simplify maintenance.

Discuss your fluid line needs with a hose and fitting specialist, your local Aeroquip Distributor. You'll find his telephone number listed in the "Yellow Pages" under "Hose." For specific reference information on the correct type of hose and reusable fittings for your application, write for a copy of Industrial Catalog No. 205.

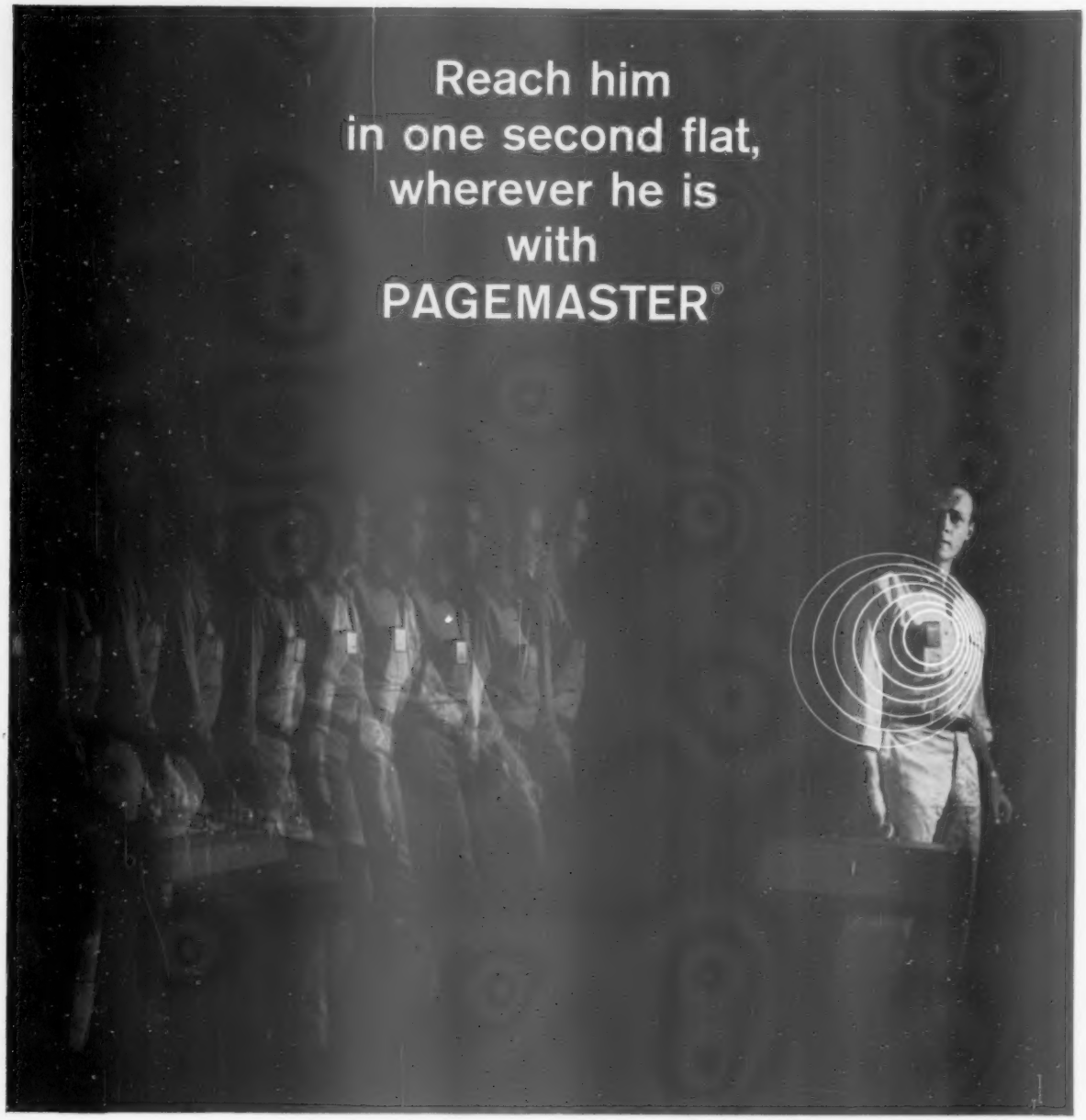


Bulk Aeroquip Hose can be cut to length and installed on the job without special tools. Fittings can be used again and again.

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN
INDUSTRIAL DIVISION, VAN WERT, OHIO
WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

PRODUCTS ARE PROTECTED BY PATENTS IN U.S.A., CANADA AND ABROAD



Find him instantly—in the cafeteria, in the plant, even out of doors—way beyond the range of conventional paging systems.

Alert him—and only him. His—and only his—pocket-sized PAGEMASTER will beep discreetly. And will sound, again and again until he checks in. For PAGEMASTER is gentle but insistent.

What equipment do you need for a PAGEMASTER Selective Wireless Paging System? Nothing more than a desk-top encoder, a transmitter, an antenna, and transistorized, feather-weight receivers. Installation is immediate and inexpensive—no costly lights, loops or speakers are needed, no expensive drawn-out structural modifications are involved. And you can add receivers—up to several hundred—as your paging applications increase.

Want to see how much faster and how much more economically PAGEMASTER reaches key people . . . to help them get things done? Your STROMBERG-CARLSON® Communications Consultant has the irrefutable facts. For his name, call Western Union Operator 25, or write:

Commercial Products Division—Box F
1406 North Goodman Street
Rochester 3, New York

GENERAL DYNAMICS | ELECTRONICS

In modern business communications...THERE IS NOTHING FINER THAN A STROMBERG-CARLSON®

For more facts Circle 470 on Reader Service Card

For more data, circle item numbers on Reader Service Card next to back cover.

Latest 16mm projector (*Bell & Howell*) packs more and better light and sound into 29-lb. unit. Does equally effective job in conference room or auditorium. Projects sharp, bright image even in semi-light room. Owes lightness to glass fiber case, miniaturized components, magnesium castings. **(257)**

From egg cleaning to weld spatter removal—there are hundreds of uses for brushes in industry. New booklet (*Newark Brush*) illustrates many of them, suggests applications that may not have occurred to you. **(258)**

Lens impact demonstrator (*Bausch & Lomb*) will help safety directors "sell" safety glasses to people working in hazardous areas. **(259)**

Add Sun-Barr (*National Glass Tinting*) to list of window coatings designed to control sun fading, glare, heat loss. Eleven colors. **(260)**

You'll be seeing more and more compacts on factory highways—aisles, that is. Newest is 182-lb., 20-in.-wide electric car (*Namisco*) that has carrying space for loads up to 100 lb. or a passenger. **(261)**

Turn the page

Careless Smoking is a Universal Problem!

SIPCO

DUNKING STATIONS

Promote Good Housekeeping
Prevent Fire Hazards
Reduce Maintenance

Model 4J-R Duo-Tone With R-G Sign

Model 4J Deluxe

WHEREVER A SMOKING PROBLEM EXISTS, THERE IS A SIPCO MODEL THAT EXACTLY FITS THE NEED.

SIPCO smokers are constructed of heavy-duty cast aluminum — Built for a lifetime of hard use. OVER 20 DIFFERENT MODELS, include MIDGET size, STANDARD size and JUMBO size. WALL models, FLOOR STAND models and PERMANENT MOUNTING models. DELUXE bright polished finish — or DUO-TONE finish (Grey crinkle canister with satin finished lid.)

MODEL 4J DELUXE (Illustrated) JUMBO size permanent mounting type with bright polished DELUXE finish. Glass fiber inner-liner is furnished.

MODEL 4J-R DUO-TONE (Illustrated) JUMBO size permanent mounting type, with sign. Wide variety of sign wording available. Glass fiber inner-liner furnished.

WRITE FOR ILLUSTRATED BROCHURES

STANDARD INDUSTRIAL PRODUCTS CO.

DEPT. FA • 3527 FARMINGTON RD. • PEORIA, ILLINOIS

For more facts Circle 471 on Reader Service Card

Spare the Chisel · Save the Parts USE KROIL

Don't ruin a valuable piece of equipment merely because some part is rusted tight. Apply Kroil, the amazing new chemical lubricant that creeps into millionth inch spaces (proved by laboratory tests), dissolves rust, supplies necessary lubrication and

LOOSENS FROZEN PARTS

18,000 of America's leading plants can't be wrong! They have used KROIL for 10 years and are still depending on it to save expensive labor and valuable parts. They say: "Kroil loosened bushings after a 12-ton press had failed" . . . "on repairing heat treat trolleys formerly destroyed every nut. Now Kroil saves them all, and time, too" . . .

You too should be using KROIL every day. Try it on money-back basis. Gallon **$4.35**; with Kroiler trigger squirt gun (shoots a drop or a stream 15 feet, if desired) **$5.25**; f. o. b. our factory.

KANO LABORATORIES 1067 Thompson Lane, Nashville 11, Tenn.

KANO LABORATORIES

For more facts Circle 472 on Reader Service Card

For more data, circle item numbers on Reader Service Card next to back cover.

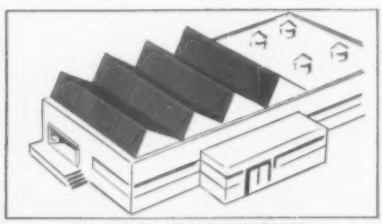
Newest copiers (*Anken* and *Ozalid*) are billed as first truly automatics, turn themselves on when originals are fed into them, make exposures, adjust to length of material, trim positives, deliver prints flat and dry, turn themselves off. Will copy originals up to 11 in. wide, 150 ft. long. **(262)**

From West Germany comes Tufftride, a chemical method of impregnating plain or alloy steels, or cast iron, with controlled concentration of nitrogen. Licensee (*Kolene*) stresses increase in surface hardness (usual reason for nitriding) is incidental to big improvement in wear resistance and toughness. **(263)**

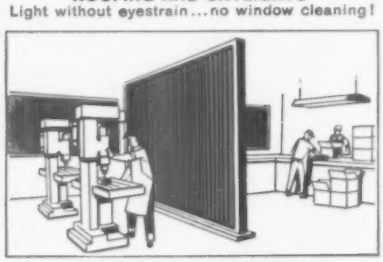
Speak-R-Phone (*Varicon*) amplifies two-way telephone conversations, gives you back your left hand. Transistorized unit turns on automatically when handset is placed on it. No connection to phone. **(264)**

Economical shelf storage is subject of new catalog (*Frick-Gallagher*) which shows how you can utilize Rotabin methods (1) to reduce present storage area without reducing capacity, thereby freeing floor space for productive use, and (2) to increase capacity without using additional space. **(265)**

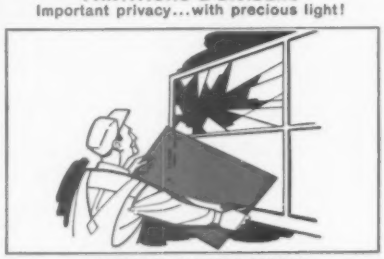
STOP REPLACEMENT COSTS WITH SHATTERPROOF BARCLITE XR1000 FIBERGLASS PANELS!



ROOFING AND SKYLIGHTS
Light without eyestrain...no window cleaning!



PARTITIONS & DIVIDERS
Important privacy...with precious light!



INSTANT INSTALLATION

Improved Barclite XR1000 is so strong, it saves money where other materials spend it. For these unique Fiberglass Panels *never need replacing!* Lighter than glass, stronger than steel...they're perfect for roofing, siding, skylighting, glazing, interior partitions—wherever you want light plus strength...without replacement costs! Thanks to a new Acrylic base resin, they're absolutely *weather-resistant* and *shatterproof*. Storm and stress can't affect them. Vandals can't break them. Immune to rust, mildew and most chemicals, they save cleaning costs, too. And translucent colors stay brighter, clearer. (Write for results of 5-year Outdoor Torture Tests, proving 300% greater erosion resistance than other panels!) And exclusive Infrablok® process insulates against heat and cold. Get the big money-saving story today!

PRODUCTS OF QUALITY THROUGH RESEARCH

WRITE: BARCLITE CORP. OF AMERICA (AN AFFILIATE OF BARCLAY MFG. CO., INC.) DEPT. FM-6-XR, BARCLAY BLDG., NEW YORK 51, N. Y.

"Made OF Stainless Steel ...Made BY Jenkins"

Valve Performance Shows the Big Difference in that Spec!

When service conditions require valves of Stainless Steel, remember that metal is only part of the answer to long, dependable valve performance.

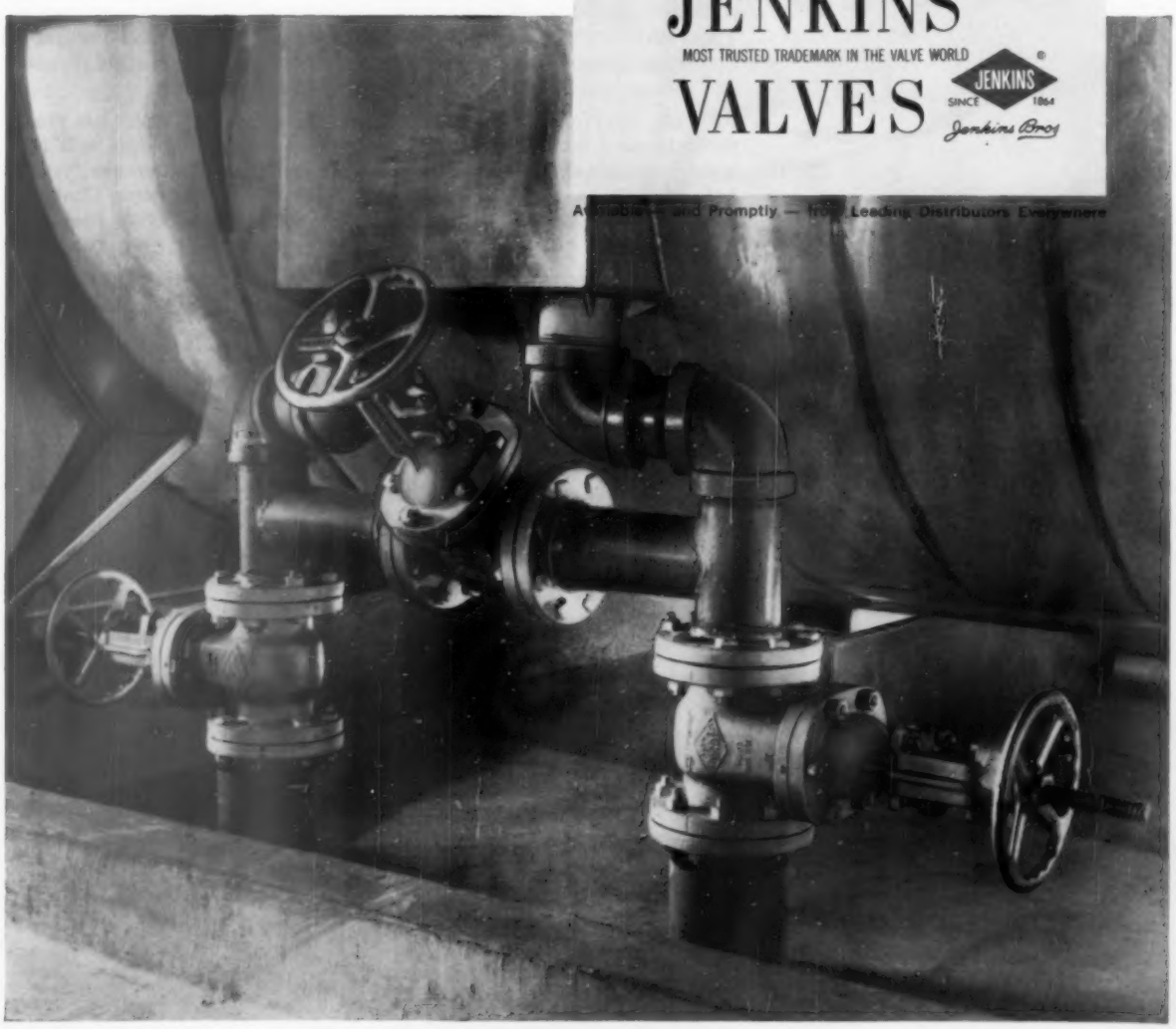
The WAY valves are made is equally important. Factors you can't even see make a big difference. Such factors as *perfection of castings . . . precision machining . . . painstaking inspection and testing . . . sound design.* Most important of all: *the maker's guiding policy about quality.*

To be sure about all these critical factors, experienced specifiers and buyers specify JENKINS as well as the metal alloy when Stainless Steel valves are needed. It is well-known that for almost a century Jenkins has made valves to *just one* standard of quality . . . the highest. At Jenkins every operation, every worker is aimed at fulfilling that standard, whatever metal a valve is made of.

SEND FOR NEW CATALOG 59-SS of Jenkins Stainless Steel valves in types and alloys to satisfy most needs. Jenkins Bros., 100 Park Ave., New York 17.

JENKINS
MOST TRUSTED TRADEMARK IN THE VALVE WORLD
VALVES
JENKINS SINCE 1864 Jenkins Bros

Available and Promptly — from Leading Distributors Everywhere



For more facts Circle 474 on Reader Service Card

District Headquarters, The Austin Company, Cleveland.

When Engineer-Builders Build for Themselves . . .

IT'S JOHNSON PNEUMATIC CONTROL

These two buildings were built, for their own use, by men whose organization has designed, engineered, and built thousands of industrial plants and commercial buildings.

As it has done for so many of its clients, The Austin Company has provided its own personnel with buildings that are attractive as well as highly functional. Both buildings are air conditioned, of course. And both are equipped with specially planned Johnson Pneumatic Control Systems to assure a consistently comfortable and productive working climate.

Wherever quality and performance are the key considerations, as they so obviously were here, you will usually find Johnson Control . . . a fact well worth remembering when you build or air condition. Johnson Service Company, Milwaukee 1, Wis. 110 Direct Branch Offices.

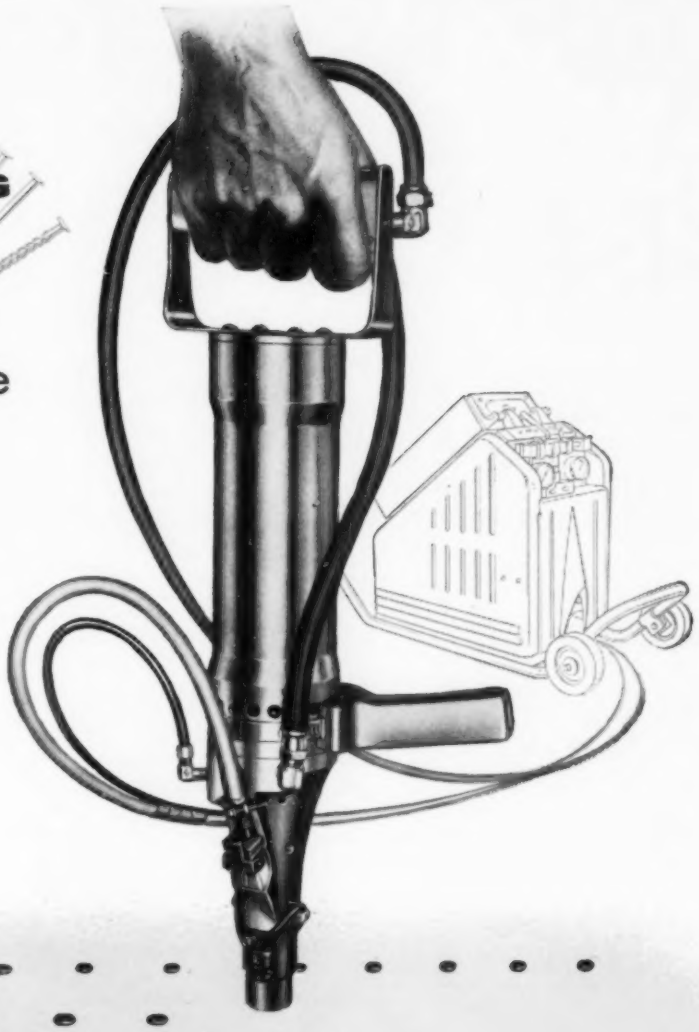
JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

General Offices, The Austin Company, Cleveland.

Suddenly **NAILING** becomes your most productive operation



...with POWASERT Automatic Nailers

New speed, ease, safety and flexibility in every plant nailing operation are yours, now, with Powasert. Whether you nail boxes, crates, skids or pallets or make any kind of wood product, Powasert automatic nailing can cut costs. Here's why.

- Speed . . . automatically feeds and drives up to 120 nails/min., either common or specialty.
- Safety . . . no recoil or shooting, no banged fingers.
- Flexibility . . . easily portable or adapted to production line, weighs only ten pounds.
- Proven . . . Powasert has already brought actual cost-savings to hundreds of manufacturers, from furniture and building components to boxes and crates.

There are five different Powasert nailers, handling sizes from ½" to 5", ready to make nailing your most productive operation. Send for complete details and see reports, today.

With Powasert you can use either common or engineered nails for highest holding power — get maximum economy, too!

United POWASERT USI-47

UNITED SHOE MACHINERY CORPORATION
Department FF, 140 Federal Street, Boston, Mass.

The Automatic Word for Fastening Speed and Savings

WING moves air, fumes, smoke... in a hurry

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For air temperatures up to 150°F.

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For temperatures up to 104°F.

Write for Bulletin AFF-61

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Quiet running. "Non-overloading" Airfoil Fanwheels. Safety type. V-Belt or direct-connected drives. • *Write for Bulletin WSF-61.*

WC 158

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DIVISION OF AERO-FLOW DYNAMICS, INC.
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ENGINEERED PLANT SAVINGS

FACTORY PLANT OPERATIONS CASE BOOK

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NORMAN H. SOLON, EDITOR

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PUSH OF A BUTTON . . .

. . . CONTROLS THE FRONT GATE.

Phantom gateman operates via TV

This audio-visual remote-control system has eliminated need for a gate man at American Standard Corporation's Buffalo, N.Y., plant. One guard now controls all vehicle traffic while seated comfortably at his desk, handling his regular reception duties.

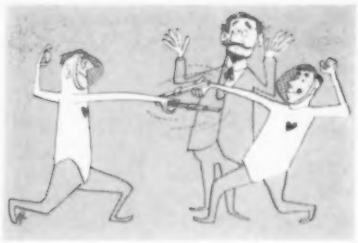
Some 100 trucks pass through the gate during a normal shift and are checked by a TV camera and microphone. The guard asks the driver his company's name, logs truck and time, opens and closes gate, just as if he were at the fence. Signs at the gate inform drivers of procedures.

All local communications are handled through speaker-mikes on either side of the gate. They're loud and clear. Drivers can remain in their cabs and still be heard by the guard.

A full picture of the 26-ft.-wide gate and approaches is transmitted through the TV camera mounted atop the plant's receiving building (circle in photo), 25 feet above the ground. It's protected by a weatherproof housing, which contains a temperature-actuated blower and heater. The lens automatically compensates for available light. Distance from lens to gate is about 70 feet.

The image is picked up by a 14-in. monitor in the guard's office. The monitor has contrast and brightness controls, as well as knobs for horizontal and vertical hold.

The system is manufactured by Motorola, Inc., Chicago.



Long looksee at engineer's inner self

Too many engineers and members of the management team excel with T-squares and ledgers, but freeze up completely when it comes to dealing with people. They're at odds with each other and can't get the best from their subordinates. Carpenter Steel Company, Reading, Pa., is doing something about it.

The company has retained a psychologist who is conducting group therapy for engineers and all levels of management from foremen up.

They meet weekly for a full morning session and luncheon. The complete series lasts eight months. The sessions consist of lectures and give-and-take discussions on all phases of human relations.

Less muscle, but a cleaner plant

Treated sweeping cloths have finally conquered the dust problem at Xerox, Inc., Rochester, N. Y. Until recently, minute particles of dust that escaped conventional cleaning methods were sucked into the plant's air-conditioning system. Too fine to be eliminated by the exhaust filter system, they clung to the inner surfaces of air ducts and elsewhere in the production areas. This dust eventually settled and adhered to coated photographic paper, causing an excess of rejects.

At first the company tried a crash two-month clean-up program involving hundreds of man-hours. This helped, but the results didn't fully justify the effort required.

The solution lay in the treated cloths (Callaway Mills, Inc., New York). The cloths are now used throughout the production area following normal wet mopping and drying. They are also used to clean the 3 miles of ductwork, eliminating the job of hand washing and drying.

Payoff: Tests showed that foreign matter in the production areas was reduced by 50%. Man-hours used in cleaning were also cut in half. This allowed the company to set up quality control standards that were twice as exacting.

Pinpointing wires

There's no trouble in identifying Teflon-insulated wires at Martin Company, Baltimore, Md. They're marked with a code that can withstand extreme temperatures, vibrations, and hard wear.

A plant-devised sintering process using an infra-red oven does the trick. The wire is identified with a Teflon foil marking, and the sintering causes a chemical fusion of insulation and foil.

The oven produces radiant heat that is quickly absorbed by the dark marking on the insulation. The temperature is controlled by a power transformer connected to a 110-volt a-c receptacle. A vari-speed-drive mechanism feeds fire through the oven at a predetermined rate. Cooling fans help control sublimation of the heated Teflon, and toxic fumes are exhausted through a stack.

The payoff is a permanent identification mark that cannot be removed without destroying the insulation.

Spray whacks 25% off insulation time

Spraying thermal insulation onto the exhaust fan of a giant gas turbine takes 25% less time than conventional methods would at Philadelphia Electric Company's Barbadoes Island, Pa., plant.

Look closely at the photo. There's a double spray emerging. The asbestos insulation (Keasbey & Mattison Company, Ambler, Pa.) is being sprayed dry from the center orifice of a special multi-orificed spray gun. The fibers mix about 9 inches in front of the gun with water jets sprayed from peripheral holes in the gun. When the mixture hits the target, it's a permanently adhering insulating blanket.

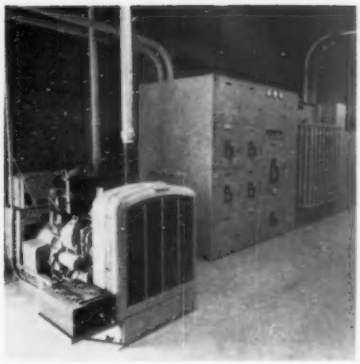
Normally, the applicators would have to hand-trowel a pre-mixed insulating cement over a reinforcing wire mesh, or cut and fit block-type insulation to the surface.

After the sprayed asbestos dries, applicators apply a smooth surface coating of asbestos-cement and cement plaster. Then they cover the entire application with an 8-oz. canvas and asbestos cloth.

Cleans the easy way

Glass-lined metal pipe has eliminated continuous reaming at Goodyear Tire and Rubber Company, Akron, Ohio. About 4000 feet of this pipe, from 3 to 6 inches in diameter, is now in use and a company spokesman reports that its initial cost has been recovered through one year's maintenance savings. Continuous reaming was necessary with the epoxy-lined pipes formerly used.

The glass-lined pipe is manufactured by Pfaudler Permutit Inc., Rochester, N.Y., for plant applications requiring a smooth, hard surface to minimize adhesion.



IN CASE OF EMERGENCY . . .

. . . there's a 60-kw. diesel generator (left) in the boiler room, and diesel and electric-driven fire pumps in the outside pump house at Hanes Hosiery Company, Winston-Salem, N. C. The diesel generator will produce emergency electricity to operate one boiler and accessories, plus key circuits throughout the plant. The pumps are located alongside a ground storage tank to provide an emergency water supply. In both cases there is an automatic changeover when an emergency occurs.

Clean room inside a clean room

This enclosure inside a clean room keeps out particles of dust smaller than one micron at AC Spark Plug Division (Milwaukee) of General Motors Corporation. And a positive air pressure of from 20 to 40 cubic feet per minute keeps whatever dust there is from settling. Air flow is controlled by baffles.

The steel enclosure (S. Blickman, Inc., Weehawken, N. J.) has utilities and microscope mounting outside the work area. And it has rotating and vertically movable assembly disks to facilitate operations. The arm ports on the side protect the operator's chest from the air flow. Coved corners make the enclosure easy to clean.

Pace as a factor in work sampling

The pace of individual workers is extremely important in work sampling studies that require relatively high accuracy, according to Prof. Gerald Nadler, Washington University, St. Louis.

For example, analyzing work for training purposes or over-all evaluation of activities does not require as much accuracy as a study for use in setting time standards.

Work sampling has always involved several assumptions. One unchecked belief is that the paces of the various operators included in the study have no effect on the work sampling results. Nadler's studies contradict this assumption.

In a survey he found:

- **Where accuracy is paramount, it's important to standardize methods first. Too often, work sampling is used in the belief that standardization can be overlooked.**
- **Work sampling can be used satisfactorily to obtain time estimates for repetitive elements in long-run jobs.**
- **When accuracy is required, work sampling should always include a sufficient number of workers to provide a satisfactory average. Serious inequities may result if work sampling studies are made with too few operators when there are many non-repetitive elements.**

Suppose a work sampling study of Man 1 performing Job A shows an over-all 80% pace. Then another study on Man 2 doing the same job reveals a pace of 120%. Usually it is assumed that if only one of these studies has been made—say on Man 1—the per-cent-of-time value also applies to the second man or any others on the job. This is a definite assumption when such values are used as allowances for a time study. If Man 1 took 9% of the time for irregular occurrence B, would this be the appropriate value to apply as an allowance? Man 2 may have taken as much as 15%.

If this assumption is taken at face value, it follows that even though only one operator might be on a job for a given study, the frequency of occurrence of important factors would be maintained at a relatively constant proportion from person to person.

A research investigation was made on industrial jobs to learn if there were any relation between operator pace and work-sampling results. The jobs used in this investigation were not changed in any way prior to making the studies. All company workers were used, and all observers were from the company whenever possible. Four jobs in different industries were studied. They were selected with the following common criteria:

- **Job was generally repetitive in nature.**
- **Five or more operators were assigned to the same operation.**
- **Each worker performed the same work independently at different work stations.**
- **Each worker was fully trained according to his company's concepts.**
- **Job was manual, controlled by the worker.**
- **Workers were paid on an incentive basis.**
- **Work was continuous enough to permit observation to be made over several weeks.**
- **Material quality was reasonably constant.**

The four jobs were:

1. Making a sand mold for a piston ring casting (16 operators).

2. Hand-assembly of diaphragm, nuts, and washers for a carburetor (7 operators).

3. Punching IBM cards for a daily report (5 operators).

4. Inserting a plastic bag inside a paper container (8 operators).

All jobs were broken into the usual time-study elements, both regular and irregular, that were listed as the activities to be observed during the work sampling study.

Data were analyzed for pace rating results, work sampling results, and pace and work sampling results taken together.

In order to increase the validity of the pace ratings in this study, several statistical techniques were used. These included average and standard deviation for each worker's ratings for all elements of the job, X and R chart for consecutive samples of two ratings for each operator for each element, an analysis of variants to allow checking if significant differences were obtained at the 5% level, and simple correlation to relate the average rating of an operator with his output.

Work sampling results were checked by standard error, p chart calculations based on groupings of one day for all operators, and p chart calculations for groupings on a two-day basis. Analysis indicated that the results permitted conclusions to be drawn.

Simple correlation was used to determine the relationship between pace and per cent of time. Correlation showed the highest degree of significant relationship for the elements not highly repetitive, such as those in which operators obtained materials whenever they needed them. The correlations were not significant for the highly repetitive elements of the job.

These results indicated that when accuracy is required, the operator's pace definitely affects work sampling results.

Source: Prof. Gerald Nadler, Head of Department of Industrial Engineering, Washington University, St. Louis, Mo.

Bad pennies return in this quality cart

Bad pennies—in the form of customer rejects—return to haunt blue-collar workers at Kaiser Steel Corporation, Fortuna, Calif. They're carried on this cart from department to department to emphasize need for quality. Competitors' products are also exhibited.

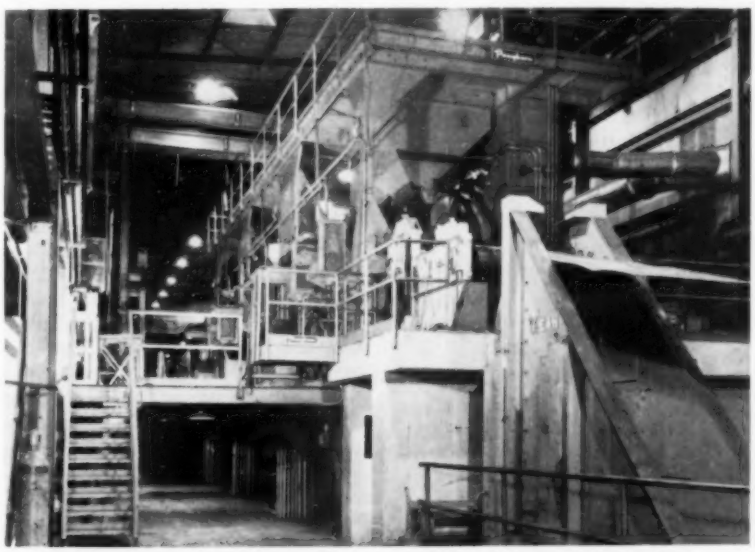
The paper taped to the inside of the cart lists recent customer orders, the number of pieces shipped, and the percentage of rejects. When the cart arrives in a department, the men gather for a look and receive a short talk by the quality control supervisor on the deficiencies of the product or products and various reactions by customers to them.

Countering loose recession talk

Believing that optimistic thinking and talk is a vital factor in bringing an early end to the recession, B. F. Goodrich Company, Akron, Ohio, is doing something about it.

Nearly 100,000 of its workers throughout the country have been reporting to work this spring sporting large button labels that read: "Business is good! As good as I make it." They were distributed to all Goodrich employees.

The company has also supplied the buttons to associates in various businesses ranging from truck tires to baby pants as part of a campaign to help the U. S. economy recover at a faster rate.



GIANT BLAST MACHINE CLEANS LIKE LIGHTNING

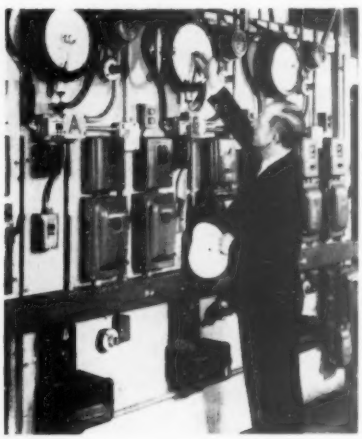
Some 120 tons of steel coil are processed every hour by the world's largest blast descaling machine at Empire-Reeves Steel Corporation, Mansfield, Ohio. The 60-ft.-long machine can handle any strip between 24 and 50 inches wide and can hurl 660 tons of abrasive per hour. Manufactured by Pangborn Corporation, Hagerstown, Md., the unit operates on pushbutton control. Twelve blast wheels—totaling 900 hp.—cover both sides of the strip simultaneously.

World's most powerful electronic computer

This electronic Ph.D.—capable of performing more than 30-billion multiplications per day—has recently been installed at Los Alamos Scientific Laboratory in New Mexico. It's the most powerful computer in the world.

Made by International Business Machines Corporation, Poughkeepsie, N. Y., Stretch can simulate within itself an entire hydrogen bomb test and analyze the results.

The Exchange (shown at left of photo) can feed up to 800,000 characters of information each second into the machine.



System keeps tabs on time and temperature

This man is changing the temperature recorder chart on one of three automatic programed controller-recorders installed on gas-fired ovens at Plastic Applicators, Inc., Harvey, Tex.

These economical instruments not only regulate the temperature of the ovens, but also control the time they take to heat and cool. The company uses the same system for ovens in its four other plants in Texas and Louisiana.

Oven temperature is critical in producing plastic coatings. Formerly, an operator had to check the oven every few minutes to regulate the temperature to the desired point. The possibility of human error was always present, and the oven needed constant attention.

Under the new system (Partlow Corporation, New Hartford, N. Y.), a plastic cam on each of the controllers is cut to match the predetermined time-temperature curve needed for an operation. A first arm follows the circumference of the cam and governs the opening of the valve. A second arm, with pen attached, records the actual oven temperature. Any deviation between the two arms automatically opens or shuts the valve to bring the oven temperature to the desired level. The temperature-recording arm also serves a secondary function. It gives a permanent time-temperature record of an operation.

The system is also equipped with cut-off controls.

Payoff: a 10% savings in labor costs and lower gas consumption.

Gumshoeing bumps on a tape recorder

A tape recorder is taking the mystery out of shipping large products overseas for Radio Corporation of America.

Recently, the company charted a plane to air-ship a 31,500-lb. computer to Sveriges Kreditbank, Stockholm, Sweden. Instead of using conventional crating, the computer was wrapped in polyethylene. This had two advantages: (1) It reduced the weight of the package, cutting down shipping charges, (2) cargo workers could see the nature of the equipment they were handling and exercise due caution.

Attached to the console was a tape recorder that registered every shock of vibration the equipment received during its 16-day journey. This gave RCA a point of reference to study further means of improving shipping practices.

To protect the computer during the trip from its plant in Gloucester, N. J., to Idlewild Airport, N. Y., RCA used a special truck. The vehicle was equipped with rubber air-bellow devices instead of steel springs in the rear to cushion the cargo against jolts.

Welding with tube gives wire the sack

Semi-automatic arc welding with a tubular electrode has stepped up fabrication work at International Harvester Company's Chicago plant. No wire is involved. Typical welding speeds with the new process are 18 inches per minute for $^{5}/_{16}$-in. fillet welds.

The process employs a new type of electrode, embodying a new principle of shielding the weld. No external shielding or fluxing material, such as gas, granular flux, or wire coatings, is necessary. Instead vapor shielding is used.

This is produced by a finely powdered flux inside the electrode. Under arc heat the flux forms a dense vapor that takes care of shielding, deoxidizing, and fluxing.

The equipment for the process is compact and very simple to operate. A control cabinet, containing the reel of tubular electrode and drive rolls, feeds the electrode current through a flexible cable to the welding gun. The operator merely pulls the trigger on the lightweight gun to start the current and electrode feed. He then moves the gun along the seam to be welded. The process employs a motor-generator type of power source.

The process was devised by Lincoln Electric Company, Cleveland.

Putting the finger on metal tank leaks

"There's no leak." That's what the lab reported after spark-testing the glass lining of a 3000-gal. reactor at General Aniline Corporation's Linden, N. J., plant.

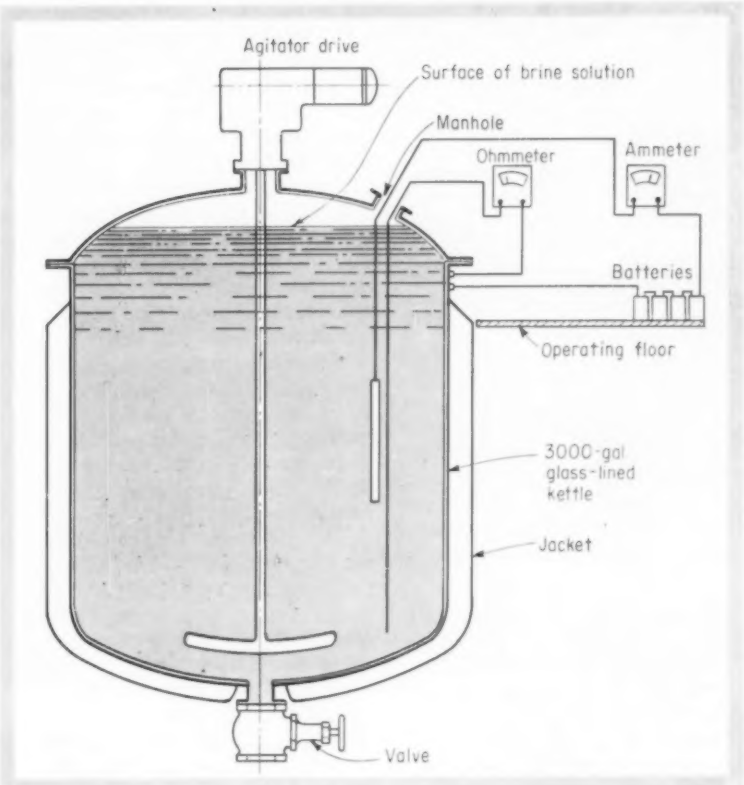
"But there must be a leak," the field engineer insisted. "The production department complains there's enough iron contamination to account for 2 ounces of metal."

This contradictory situation prompted a test to determine whetner an electric current could penetrate the insulating glass lining. it it did, there was a leak. Here's how it was done:

The reactor was filled with water and 900 pounds of commercial quality salt. A length of No. 14 copper wire was bared at both ends and inserted through the cover manhold into the brine. The other end was connected to a d-c/a-c ohmmeter. The ohmmeter was also connected by a second wire to be cleaned area on the outside of the reactor's steel shell (see diagram). An infinity reading would have indicated the vessel was leakproof. However, a low-resistance reading was obtained, which meant that a break in the non-conductive glass lining was permitting the electric current to flow from the liquid to the shell. Another test was then given to confirm the result.

Several dry cells were lined up in series to impress 32 volts d-c across the circuit. Then a clean 1-in. steel pipe about 3 feet long was connected to the batteries and lowered 2 feet into the brine by means of a cotton rope. At the other end of the batteries, a wire through an ammeter completed the circuit to the steel shell. A current flow of 1 amp. gave conclusive proof of the leak's existence.

After the tank was drained and ventilated, a second spark test using 5000 volts was made. This time a Teflon patch was discovered to be leaking. The fault had escaped detection the first time because the gap from the outer edge of the dry Teflon plug to the bare metal beneath was too great for the 5000 volts to jump. (With wet Teflon there's no problem.)



The test was further improved to eliminate the need of a spark tester. A 500-gal. steel tank with a loose vinyl bag liner was suspected of having a leak and given the ohmmeter test. A reading of 2 ohms confirmed the leak.

A nearby motor-generator type of welding machine was used to supply a d-c potential of 80 volts (any similar type of power source could have been used). This potential was impressed on the brine through a clean steel pipe hung in the solution and acting as a positive anode. Then the area at the top of the tank was darkened. Some 15 minutes after applying the voltage, cloudy brine began to clear. In another 15 minutes faint sparking could be seen at five points. Slow bubbles of hydrogen gas rising from these points indicated leaks.

(A spark tester could not have pinpointed these leaks because the vinyl material only leaked when pressed by the weight of the liquid against a bump on the tank shell.)

The gas bubbles were hydrogen because the pipe was positively charged. In this case the tank itself acted as the negative pole. If the polarity had been reversed, the gas would have been chlorine. (Hydrogen is the more desirable of the two gases as it weighs less, rises faster.)

This method of testing vessels with non-conductive liners can pay off in four ways:

1. It's an inexpensive method for plants that haven't a 5000-volt a-c spark tester.

2. It's non-destructive. If the tank contains a conductive nonflammable liquid, it need not be emptied. And if no leak is found, nothing is lost.

3. It's quick. There's no need for a man to enter the vessel.

4. It detects some kinds of leaks that can't be spotted with conventional spark testers.

Source: Leif Poll, Maintenance Engineer, General Aniline Corporation, Linden, N. J.

YOU BE THE ARBITRATOR

THE CASE OF

The Sabbath work day

Out of the experience of the American Arbitration Association

In prewar days, a smelting and refining company put into effect a continuous work week, with all employees in certain departments working occasional Saturdays and Sundays as part of regular rotating shifts. Later, the system was changed to a Monday-through-Friday schedule, with premium rates for any weekend work. This system was still in effect when the union was reorganized.

Recently, when the company decided to go back to the old system, the union objected. "You can't do this without negotiating the change with us," said the union representative. And he cited a contract clause that read:

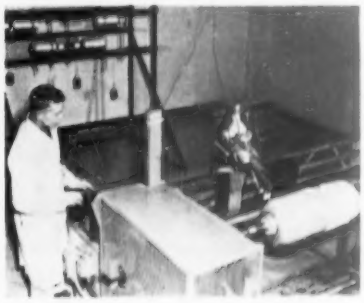
"Working practices and conditions which have been established by custom and were in effect prior to the execution of this agreement shall not be changed during the life of this agreement without mutual consent."

But management had a different interpretation. "That clause means we can't set up operating procedures that were never in effect before," the plant manager declared. "It doesn't stop us from reinstating a system that was in effect for many years."

Eventually the case went to arbitration. If you were the arbitrator, how would you rule?

For the actual decision turn to page 180

Budget-saving way of winding filaments



Filament winding process for making glass-fiber motor casings need not be an expensive proposition. Engineers at United Technology Corporation's Sunnyvale, Calif., plant constructed their own machine for this operation at a cost of $3500. Similar machines on the market carry price tags of approximately $20,000.

Here's how the new UTC filament-winding process works:

A mold is made in the shape of a hollow mandrel with a closed-end configuration. Water-soluble plaster is cast into the mold and oven-cured after removal of the mold.

After curing, the plaster mandrel is sprayed with a white rubber material that serves as the liner of the motor. The mandrel is then placed on the UTC machine for the winding process.

Four spools of glass fiber, mounted at the rear of the machine, are held into a tension device that provides constant pull on rope going into the casing. Ropes are impregnated with an epoxy resin by passing them over a wheel that dips into the bath, then over the length of the cylindrical mandrel in a helical winding pattern. Heat lamps keep the resin in liquid form.

After the winding operation, the casing is cured. Then water is squirted inside it, dissolving the water-soluble mandrel.

Independent lift loads by itself

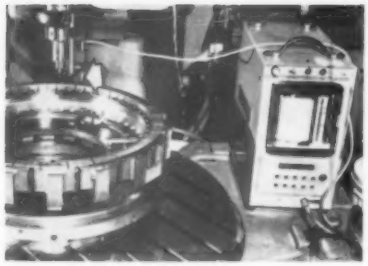
This vertical lift is its own starter, delivery boy, and muscle man at J. H. Allison & Company, Chattanooga, Tenn. And it has eliminated a first-class traffic bottleneck from ground-floor production to first-floor shipping.

Men used to load cartons onto hand carts for transport to the shipping area via the freight elevator. However, this required quite a bit of manual handling. And the stacked cartons sometimes took a tumble when carts bumped obstructions or rolled over uneven floors.

An inclined belt was not feasible since it would require extensive modifications to the plant. Reciprocating lifts were ruled out because they couldn't handle the six cartons per minute needed to match production-line speed.

Now the cartons are fed by gravity conveyor to the Escaveyor lift (Standard Conveyor Company, North St. Paul, Minn.). It's compact enough to install without major modifications in the plant. It self-loads, lifts straight up, unloads automatically, and handles 10 loads per minute. Series of platforms are secured to endless chains moving in one direction and powered by a common-drive shaft.

Result: A reduction in operating costs large enough to pay for the Escaveyor in one year.



Keeps a tight rein on tolerances

This pneumatic gauge plays nursemaid to automatic indexing jig bores at General Electric Company, Evandale, Ohio. It's equipped with maximum and minimum tolerance lights, index chart drive, and buzzer signal. Here's how it works:

An adjustable bracket is mounted to the quill of the jig bore to hold a floating spring-urged spindle. After the first hole is bored, the spindle automatically gauges and records the size. If the hole exceeds pre-set tolerances, the recording buzzer sounds and the appropriate light goes on. This warns the operator to make adjustments before the next cycle begins. Recorded dimensions are noted and used for inspection purposes.

Besides reducing scrap and saving production time, the gauge is a valuable maintenance tool. It can forewarn of tool wear and breakdown. In one case data supplied by it led to a design change that gave longer life to boring tools.

The gauge is made by Sheffield Corporation (Dayton, Ohio), subsidiary of Bendix Corporation.

Sounding out width

One man can measure the thickness of sheet steel to micrometer accuracies in seconds at Eastern Steel & Metal Company, New Haven, Conn. This ultrasonic device (Branson Instruments, Inc., Stamford, Conn.) does the gauging.

The company formerly used hand micrometers, but there were two jokers to this. First, the operator had to have access to both sides of the sheet to take the measurement, which was time-consuming. Second, he couldn't wear work gloves, which created a hazard.

Now, after a short training period, the operator can read the gauge easily. Thicknesses from about 0.005 inch to 2.7 inches can be determined to accuracies of 0.1%.

Corrugated boxes slash time 60%

A switch from wooden to corrugated boxes caused a 60% nose dive in packing time at Palmer Engine Company, Cos Cob, Conn. And slashed packing costs as well.

Under the old method the engine was bolted to a wooden base, and a housing of 14 wooden strips had to be built around the engine. It used to take one man eight hours to package three engines.

Now the engine is still bolted to a wooden base, but a bottomless corrugated box is slipped over it. Tough corrugated end pieces, with a bursting strength of 500 psi. are inserted to protect the box during handling. The box is then nailed to the base and the entire unit is reinforced with two steel strips, applied with a semi-automatic strapping tool (Stanley Steel Strapping Division of Stanley Works, New Britain, Conn.). This means one man can package seven to eight engines during a single shift.

Also, the new package is 15% lighter than the old one, thus saving on freight charges.

CASE BOOK CAPSULES

Accidents of all types accounted for a loss of $100-billion and took almost a million lives during the past decade, according to the U. S. Chamber of Commerce.

Noise and vibration have been largely eliminated with a new die-cutting machine developed by United Shoe Machinery Corp., Boston. Operation depends on pressure rather than impact.

Working characteristics of a wide range of metals can now be improved by purification without changing original analyses. A new chemical treating process is being marketed by Crown Chemical Metals Corp., Providence, R. I. Applied in molten state, it virtually eliminates shrinkage porosity.

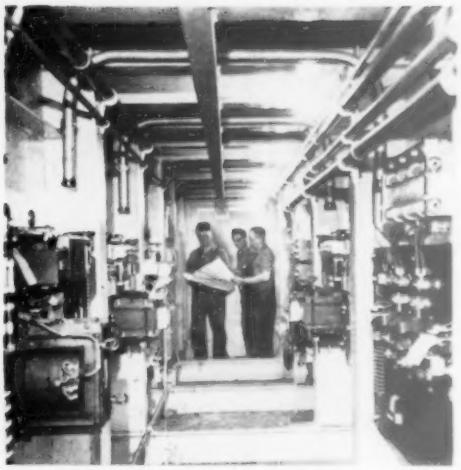
Self-contained air-conditioned suit can keep the wearer comfortable in temperatures ranging from 40 deg. below zero to 135 F. It has been developed by Navy scientists in conjunction with Westinghouse Electric Co., Pittsburgh.

Man-hours lost because of strikes in California last year were fewer than any other year since World War II. The drop between 1959 and 1960 was about 74%.

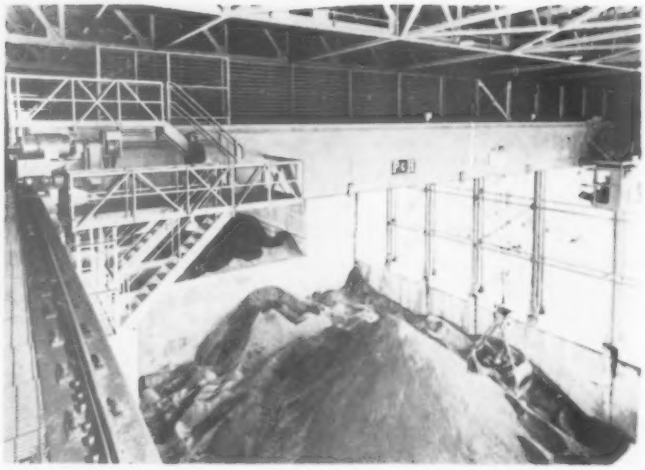
Railroad safety device that can automatically detect broken wheel flanges and loose wheels on passing freight trains is now being marketed by Servo Corp. of America, Hicksville, N. Y.

Aluminum may be reduced directly from bauxite in the future, either by use of temperatures up to 30,000 C. or by accelerated atomic particle reduction similar to present cyclotron concepts, according to a research scientist at Reynolds Metals Co., Richmond, Va.

Raw lumber can be dried electronically by a new process devised by Chemetron Corp., Louisville, Ky. The unit will reduce drying time to several hours as compared to the days or weeks required in conventional kilns.



MEN WORK IN THE BELLY . . .



OF THIS TRAVELING CRANE.

Hallway cuts through traveling crane

A maintenance shop is located right in the heart of this traveling crane at Ash Grove Lime and Portland Cement Company, Chanute, Kan. The interior of the main girder is hollow fuselage containing a well-lighted corridor in which strategic controls and power components are placed. And there's plenty of room inside for a maintenance crew to work. The corridor is 8 feet high, 5 feet wide, and extends almost the full length of the 120-ft. girder.

The crane's hollow-beam construction provides a certain degree of protection for the sensitive electronic controls. But absolute safety is also assured since the passageway is pressurized just like an airliner cabin. Pressurizing is done by a relatively small but powerful blower that forces air continually into the girder. The air is first screened through wool bag filters with self-cleaning apparatus.

A pressure of about 2 pounds above the outside atmosphere is maintained. This is ample to prevent dust seepage, at the same time affording protection against excessive heat accumulation from components within the girder.

As a result, maintenance takes only 25% of the time required by a conventional system.

The walk-in crane is also applicable in steel mills, copper smelters, bulk chemical and other plants where corrosive and abrasive atmospheres prevail.

The crane is made by Harnischfeger Corporation, Milwaukee.

Erasing a problem

An ordinary rubber eraser is being used to rub out a knotty inspection problem at Boeing Airplane Company, Seattle, Wash.

Fluoroscopic inspection of machined magnesium castings was just working too well. Under black light equipment, excess penetrant particles glowed so brightly that inspectors had difficulty in interpreting what they were seeing. Now most of these particles are erased first so as to make the inspection process easier and more accurate.

Gee, wives will like this safety plan

Trading stamps—the greatest boon to the American housewife since the soap opera—have moved into the field of industrial safety. They're being used to encourage good safety practices at Midwest Manufacturing Corporation (Galesburg, Ill.), subsidiary of Admiral Corporation.

Some 3000 stamps will be given each month to a member of the plant's winning department, based on the lowest number of accident points per 10,000 man-hours. A minor cut, for example, is rated two points, while an injury requiring a visit to a doctor counts as five points. A department is charged 15 points for any accident not reported to first aid the day it occurs. A lost-time accident automatically disqualifies a department from consideration that month.

At the end of each month a drawing will be held in the department that has accumulated the lowest number of points. The winner will get the stamps.

Reprints of the Plant Operations Case Book are available. Price 50¢. For quantity prices, write Reader Service Department. FACTORY, 330 W. 42nd St., New York 36.

Shower stalls for industrial machines

Cleanliness is a necessity, not a luxury, at American Sugar Refining Company, Charlestown, Mass. This meant that sanitation had to be a prime consideration in building the plant.

Even the packaging room is set up to facilitate washdown. The automatic gluer (photo) and other machines rest on concrete pads shaped like shower stalls to trap the wash water. The pads are lined with epoxy resins to protect the concrete and to present an easily cleaned hard surface. Any sugar that's washed away in these pads is not lost. Drains lead to a collection pump from which the dissolved sugar can be salvaged and re-refined.

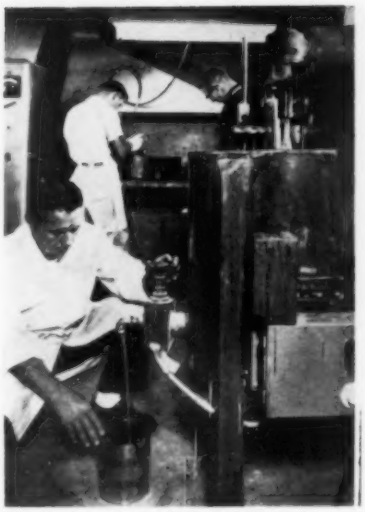
For machine cleaning, housekeeping crews use a vacuum cleaner, then wash down the equipment with a fine spray. Conventional air blowing is no good because it would simply transfer the dirt elsewhere.

Cash for brainstorms

It pays to be a junior Rube Goldberg at any Lockheed Aircraft Company plant across the country. When the company files a patent application on a worker's invention, the employee is automatically $50 richer. And that's only the beginning.

As soon as the idea is patented, the worker receives a second windfall of $500. And if the patent is licensed to an outside company, he gets a substantial share of the royalties. He receives 20% of the first $100,000 of royalties, 10% of the next $400,000, and 5% of everything over $500,000.

A special patent committee has been set up by the company to consider additional cash awards when employee inventions are used by Lockheed divisions or subsidiaries.

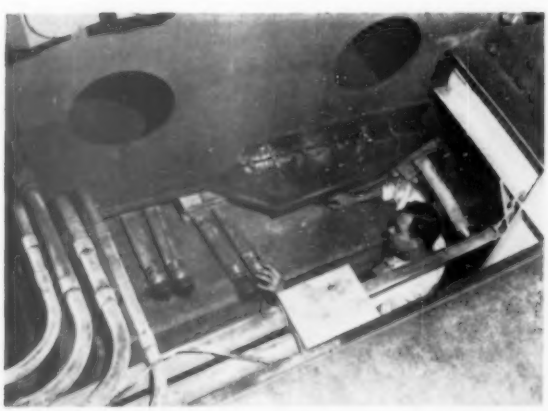


Epoxy mixmaster

Epoxy is kept in a whirl with this melter agitator unit at Magnetic Controls Company, Minneapolis.

The compound meter (Sta-Warm Electric Company, Ravenna, Ohio, reduces large quantities of epoxy resin to workable viscosity. A power agitator mounted on top of the unit provides constant stirring.

In the past a 1-gal. reservoir was used with a drill press rotor for mixing. But this limited the amount of epoxy the plant could have ready for use. With the new system much greater amounts can be stored.



FIRE HOSES SUBSTITUTE FOR JACKS

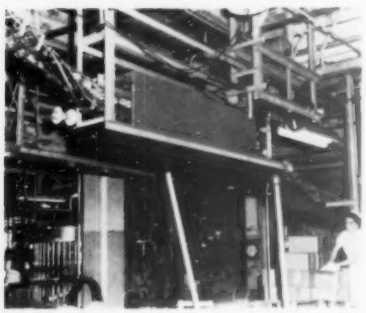
Fire hoses doubled as jacks to hold up 300 tons of equipment recently at Boeing Airplane Company, Seattle, Wash. The structure developed a ¼-in. sag which was a potential trouble source.

About 5 inches of working space were available between the base of the structure and its concrete foundation. Wide planks were shoved into the space and standard 2½-in. fire hoses inserted between them sandwich-style (*left photo*). Capped on one end and attached to a pressure pump on the other, the hoses were filled with water. This raised the structure enough to allow metal shims to be inserted (*right photo*).

Up to 200-psi. hydraulic pressure—all the hoses could bear—was needed to do the job.

COLD FACTS ON HOT STORY

Temperatures up to 10,000 C. can be measured and controlled with this pyrometer at North American Aviation, Inc., Canoga Park, Calif. It records changes to less than one degree. The device looks like a 16mm movie camera and is mounted on a tripod in front of the heat source. It operates on the principle of heat sensitivity and is made by Pyrometer Instrument Company, Inc., Bergenfield, N. J.



Magnetic conveyor gives a fast ride

Some 240 cans are fed into the rinser every minute at Welch Grape Juice Company's North East, Pa., plant. And their open bottoms are completely exposed to the water jets.

Two chains used to carry cans through the hot water rinse at 180 units per minute. But the can rims rested directly on the chains, partially blocking the entry of the water. The abrasive action of the chains also damaged the can flanges. This resulted in line stoppage.

Magnetic rails are now mounted above the can rinser's endless rubber belt to secure the inverted moving containers. The bottom supports (see photo) drop away just before the cans enter the rinser. This means the water jets reach the entire inside area of the cans.

The system was made by Eriez Manufacturing Company, Erie, Pa.

Foam keeps heat inside this plant

Insulation was the major concern when P. L. Robertson Manufacturing Company, Milton, Ont., roofed over its open areas between buildings to cut heating costs. Frigid Canadian temperatures frequently reached 10 and 15 below zero during three months of the year.

Urethane foam applied with a Freon blowing agent provided efficient insulation. The K factor of the finished foam was a low 0.12, twice as effective as most insulating materials. Number of closed cells in the foam totaled 90% and adhesion to metals was 35 to 45 psi.

The spray operation also eliminated need for priming, adhesives, and clips, as well as cutting and fitting. Reaching hard-to-get-at corners behind truss beams was an easy task for the spray gun.

The urethane foam was developed by Electro Chemical Engineering & Manufacturing Company, Emmaus, Pa., and the Freon blowing agent was produced by E. I. du Pont de Nemours & Company, Wilmington, Del.

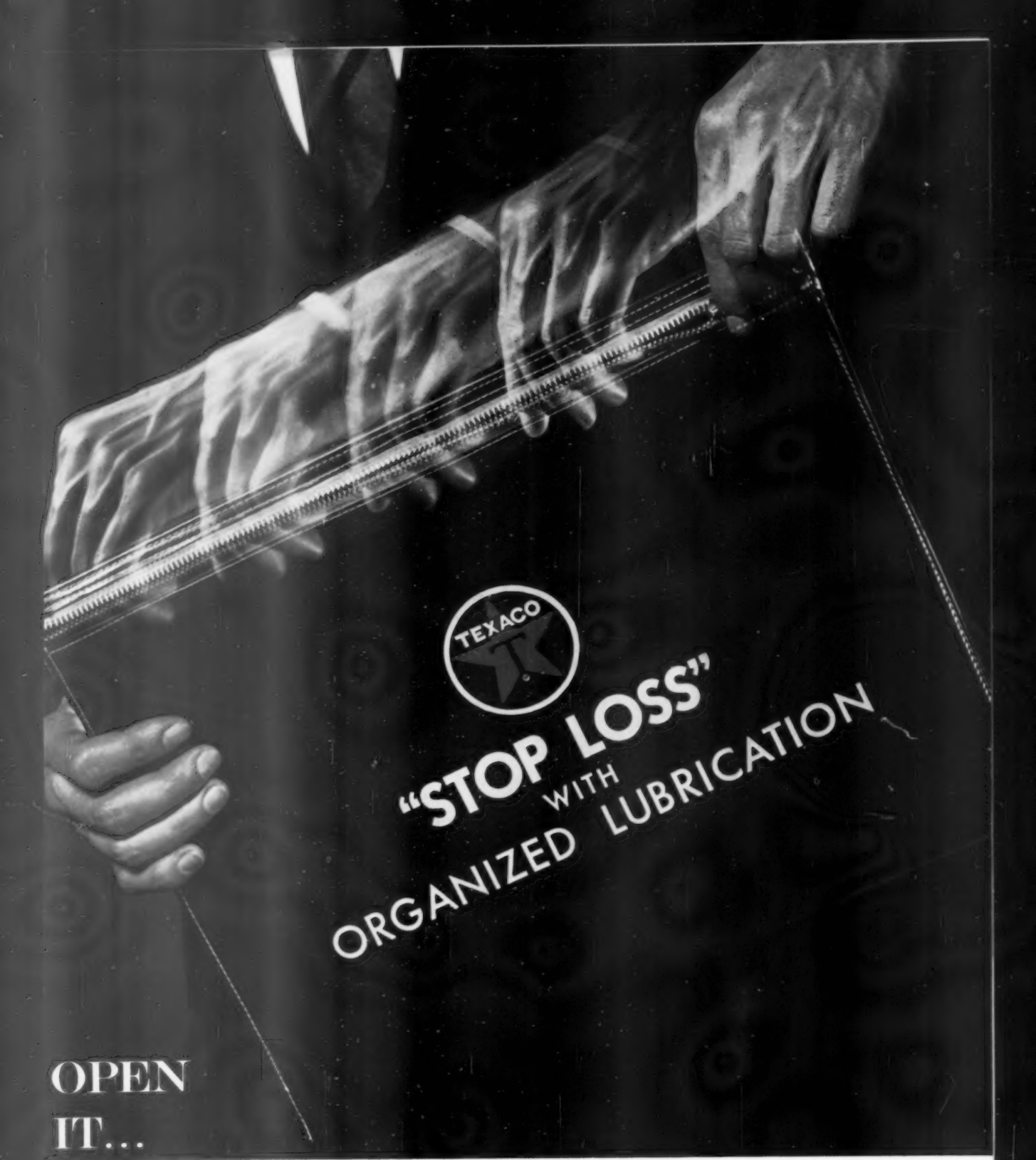
YOU BE THE ARBITRATOR

Continued from page 176

The award: The arbitrator said that it seemed logical that a work schedule from which there had been no deviation for many years prior to the date of the first contract with the present bargaining agent, and for additional years before a change was sought in it, had been "established by custom." For that reason, the arbitrator felt that the action of the company in changing the work schedule of the employees was improper.

Caution: The award in this case is not an indication of how other arbitrators might rule in apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.



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horizontal grinder

delivers maximum horsepower on the work!

Field tests on the new Cleco 600 Series Horizontal Grinder clearly show that here is an air tool that will be in great demand!

Operators like its feel . . . its lighter weight . . . balance . . . vibration-free performance . . . power on the job.

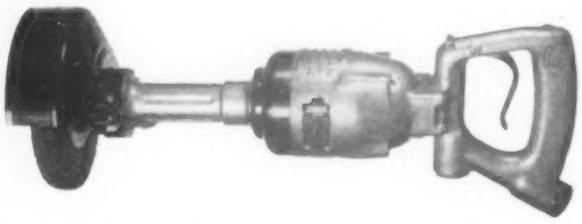
They like the one piece spindle and motor casing, line-bored for perfect alignment . . . the externally adjustable governor . . . easy throttling . . . 360° directional exhaust . . . quick-response governor for more positive governor action — stainless steel governor spider that resists corrosion.

Typical comment: A lightweight grinder for heavy-duty jobs!

The Cleco 600 Grinder is available in speeds of 4500, 6000 or 9000 RPM, with lever throttle, wing nut throttle or spade handle.

And many parts are interchangeable with Cleco's comparable vertical grinder. Greater savings in stocking of repair parts.

Let your Cleco representative arrange for a demonstration-tryout today. Then you will see why this tool is a high-production tool! We like to make them . . . you will like to use them!



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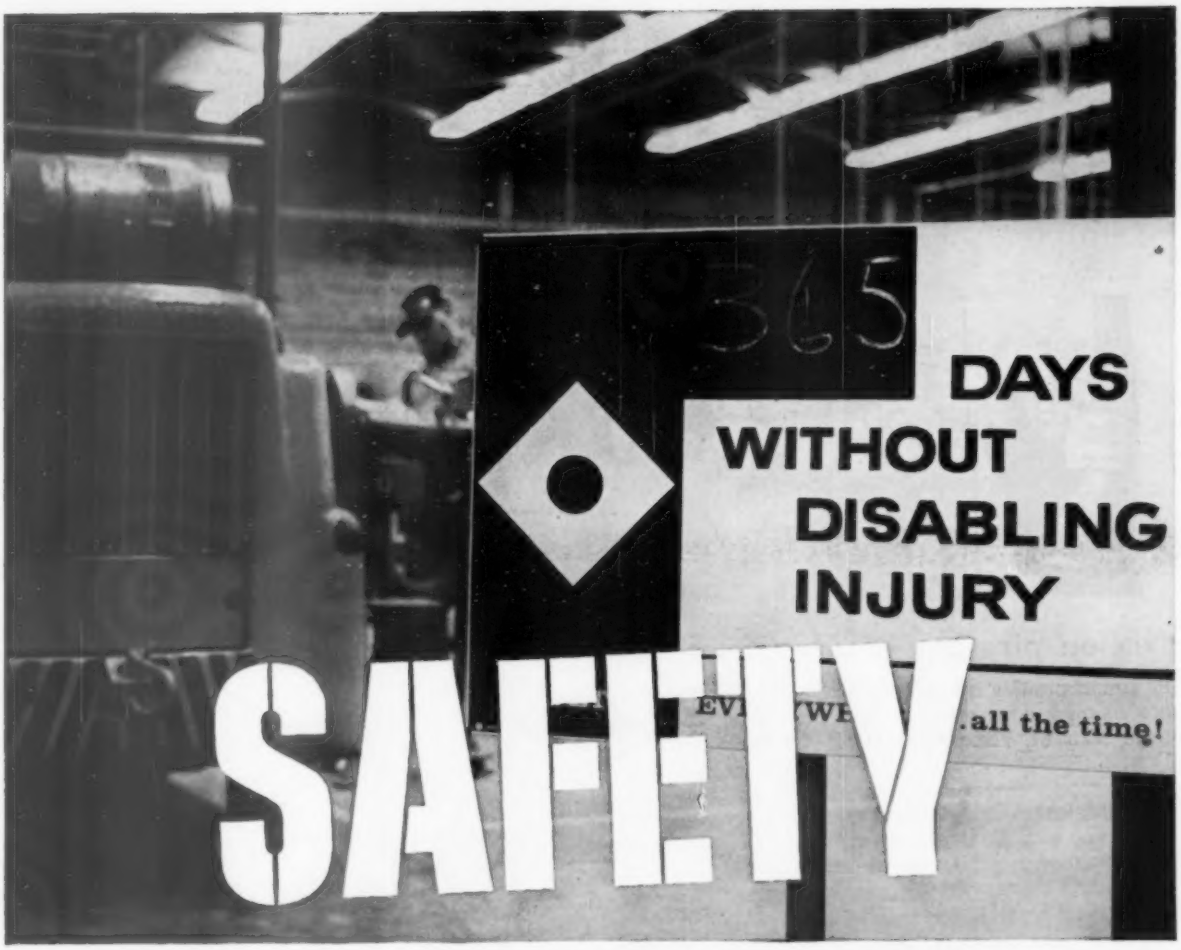

WHEN THE PROBLEM CALLS FOR PAINT THE BEST ANSWER

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To help you make sure you *are* making the most of paint to safeguard the lives of your plant personnel, why not call in your Barreled Sunlight representative for free "Color Survey" Service. This personal, in-plant survey by a trained color expert includes formal recommendations for a complete, practical painting plan tailored to your exact plant requirements.

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I want to learn more about your Free "Color Survey" Service.

☐ Please have your representative call to arrange an appointment at my convenience.

☐ Also, please send me your "Quick Reference Guide" to Barreled Sunlight Paints, plus your booklet, "How To Reduce Painting Costs".

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Title.....

Company.....

City.....*Zone*.....*State*.....

HUMAN RELATIONS

By Vivian Lunardi, Assistant Editor, FACTORY

Nix on pirating at meetings

Personnel pirating is undermining the effectiveness of professional conventions. This accusation comes from Van M. Evans, executive vice president of Deutsch & Shea, Inc., New York consultants.

The accelerating pace of technological and scientific advances makes attendance at these meetings a must to keep up with the latest information. Yet companies are reluctant to send their engineers and scientists for fear of losing them to competing firms.

During the past few years hospitality suites, hiring-hall procedures, and other gimmicks have turned professional meetings into recruiting side-shows. Even companies with no need for technical manpower launch "defense recruiting" campaigns just to keep up with the pack. A return to professionalism can eliminate the "market-place" stigma of these conferences, says Evans, if societies . . .

- Agree to ban all interviewing, entertainment, and advertising for recruiting purposes.
- Request all companies with professional personnel to cease recruiting practices.
- Urge members to cooperate fully in this action.
- Understand that these restrictions are binding only at professional society gatherings.

Manager-making seminar

Good scientists and engineers seldom make efficient managers. Wrapped up in protons, logarithms, and slide rules, they have little chance to develop skills in human relations. But there's a cure for "technicitis."

It's a management development seminar being offered at Pennsylvania State University (University Park) from June 25 to 30. The seminar, of primary interest to engineers, physicists, mathematicians, and chemists, will stress middle-management problems.

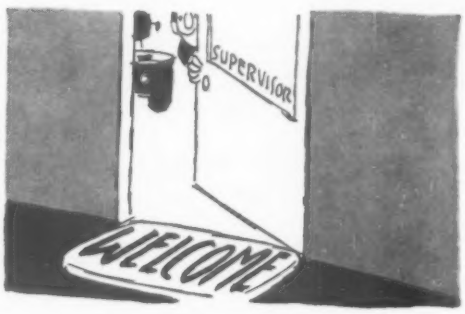
Speakers will be business men, management consultants, scientists, and academicians.

Hidden costs of turnover

One way to save money is to reduce turnover and absenteeism. An analysis of supervisor turnover is a step in the right direction, according to B F S Psychological Associates, Inc., New York consultants.

A recent survey on hiring and replacement costs turned up a definite link between turnover of supervisors and absenteeism in the rank and file. The higher the turnover, the greater the absenteeism.

How much can you save by cutting down turnover? Of 80 companies queried, nine claimed it cost from $50 to $2000 to fill the simplest clerical jobs. On jobs requiring higher skills, estimates ranged from $250 to $7000. These figures are based on costs for recruiting, orientation, breaking-in, training, spoilage of materials, tool breakage, unemployment compensation rates, termination and hiring expenses.



Round-robin hospitality

"Be my guest," says one supervisor to another at General Motors Corporation (Linden, N. J.), and he really means it. No flippant remark, it's all part of a training program to familiarize foremen and general foremen with one another's problems.

Two supervisors, with little or no direct contact on the job, alternate host and guest roles weekly. For one hour, the guest sees his host in action. He discovers different ways to solve common problems. And he can better understand how other functions fit into the total plant activity. Later in the week, the two supervisors exchange roles.

Other benefits accrue from this two-hour training session. It improves plant teamwork; planning, quality, and cost control; human and labor relations; absenteeism control; and recordkeeping. Furthermore, the supervisors almost unanimously favor the program and believe it to be beneficial.

Turn the page

when management (or governments) make the **big** *decision . . .*

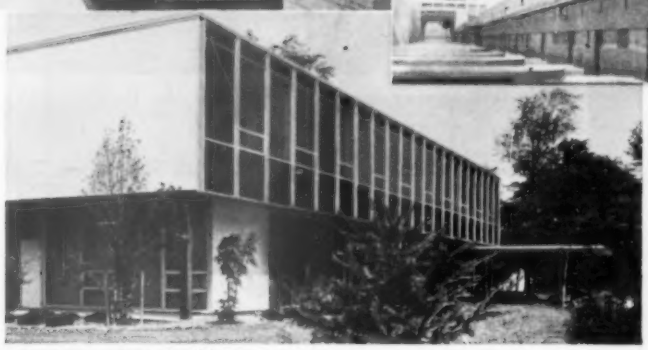
on construction projects . . .

—IT'S MAHON

case in point—
the
St. Lawrence
Seaway

fabrication by Mahon
Aerial view (at right) of Eisenhower Locks of the St. Lawrence Seaway. The 85-ft-high miter gates (below), were precision-fabricated by Mahon. Each section weighs 261 tons.

building products by Mahon
Almost a mile of 28-ft. high Mahon aluminum Curtain Wall went into the recently opened Moses-Saunders Power Dam—a vital facility of the St. Lawrence Power Project. Engineers: Uhl, Hall & Rich, Boston and Hydro-Electric Power Commission of Ontario, Canada.



building products by Mahon
Electrified cellular M-Floors from Mahon were used in the St. Lawrence Seaway Corp. Administrative Bldg. Architects: U. S. Dept. of Engineers, Buffalo Dist.

At Mahon, progressive management finds full technical resources for an extra-wide range of construction requirements—welded-steel fabrication, structural steel fabrication and erection, or building products. For almost 50 years, American industrialists and project managers have made Mahon an important factor in their building plans. Mahon has earned this respect the hard way—on the tough jobs. For Mahon has a way with metals, whether it be custom fabrications or standard products. You should be aware of Mahon's capabilities, capacity and products and how they would benefit your construction . . . your costs . . . and you. Mahon invites your consultation.

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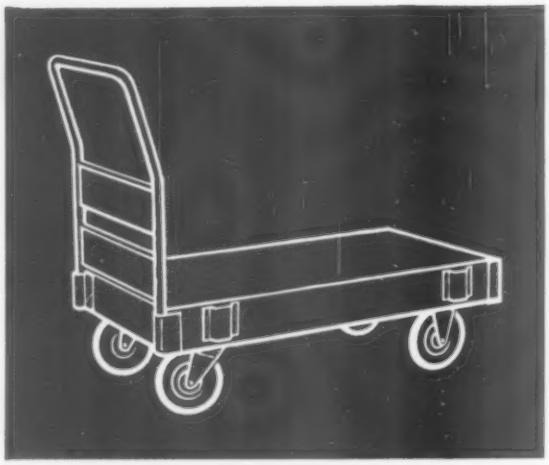

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Even the women in your plant can handle lightweight Wear-Ever aluminum trucks. This newest addition goes like lightning, yet stands up to long, hard use. One-eighth-inch thick, heavy-duty aluminum base. Eight-inch diameter rubber-tired casters roll smoothly over uneven floors. Special panels (two sides, one end) turn 47" x 23" flat bed truck into a panel truck. Send reply card for full details on this and other Wear-Ever trucks; or write Wear-Ever Aluminum, Inc., New Kensington, Pa. Immediate delivery.

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Begins on page 184

HUMAN RELATIONS

Let 'em eat car cakes

Some people profess to eat their hats, but have you ever heard of eating automobiles? No feat at all for employees at the Lorain (Ohio) assembly plant of Ford Motor Company. The car they ate was made of cake (with frosted icing) to celebrate the first birthday of the company's compact.

Sixteen feet of "compact-shaped" cake rolled down the assembly line between regular runs. At the end of the line, after formal cake-cutting ceremonies, the cake was served to hundreds of plant employees.

Germans offer job exchange

On-the-job experience in German industry is yours for the asking through a new program designed for experienced businessmen and engineers. It provides an opportunity to learn while working for a German company over a six-month to two-year period.

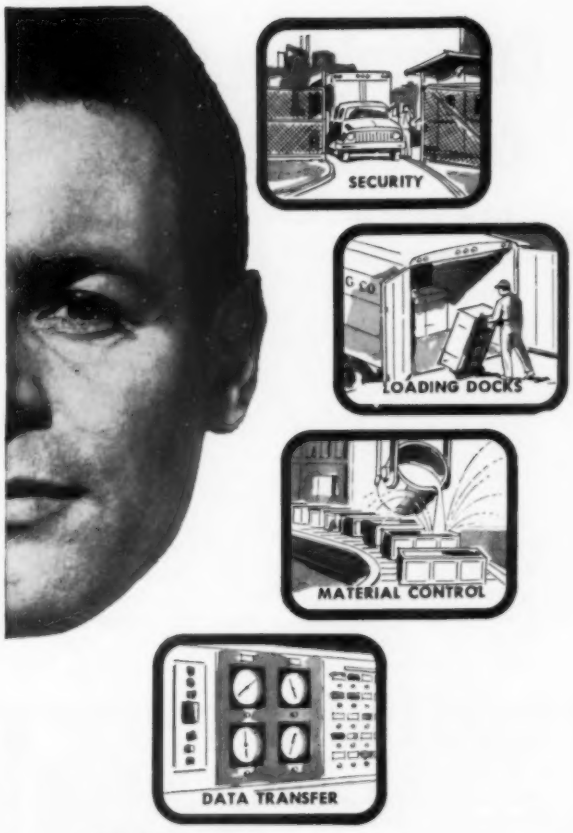
Participating Americans receive three months' instruction in the language, business, and cultural life of the country before placement.

The Carl Duisberg Society (Cologne, Germany), supported by German industry and private individuals, is sponsoring the program.

VIPs with civil service minds

The bureaucratic mind is spreading like a cancer, says Prof. Eugene E. Jennings, Michigan State University (Ann Arbor). In industry it reposes in the skull of the organization man who would rather conform than lead. Such conformity of thought subordinates great men to efficient men. Thus we have the executive type who has dethroned the leader. Jennings' criticism is that today's leaders shun responsibility—without endorsement they hesitate to make decisions. Security counts more than freedom of thought.

Another opinion on organized stagnation comes from Crawford H. Greenwalt, president of Du Pont Company, Wilmington, Del. In an address at Princeton University, he defined conformity as a vice that is first endured, and finally embraced. Industry can



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Many of your critical building services can now be monitored and controlled from a centralized location. For example, one man can monitor boilers, start and stop motors and check liquid level controls. In addition, at the Honeywell Centralized Control Panel, he is instantly alerted to a security violation at any building or area through a number of electronic security devices such as the Sono-Sentry below.*

Centralized control minimizes the possibility of human error, frees guards and other employees for more productive work and virtually eliminates losses from fire, theft or vandalism. For further information, call your nearest Honeywell office. Or, send the coupon below. **Trademark*

Central Control Panel. The Honeywell Central Control Panel is the heart or communication center for all your building services including security. The panel may be as simple or elaborate as desired.

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Begins on page 184

HUMAN RELATIONS

combat it by providing a climate that encourages dynamic thought. Such a climate could stimulate men of ordinary stature to extraordinary performance. The current "line of least resistance" should be discouraged. Those who choose security over individualism are doomed to mediocrity, he predicts.

Sanforized dollar outmoded

Who cares about dollar erosion when purchasing power remains high? Like death and taxes, it's something to accept because there's no alternative. The latest figures offered by the National Industrial Conference Board, New York, show how much your salary has shrunk in purchasing power over the past 22 years.

In 1939, a man with three dependents and an annual salary of $3000 had $2970 to spend after taxes. Today his counterpart must earn $7270 yearly to buy the same quantity of goods. Inflation has decreased his purchasing power $3401, while income and social security taxes have taken another $899.

Other comparative salaries based on purchasing power: $1500 in 1939, $3383 today; $5000 in 1939, $12,510 today; $10,000 in 1939, $26,476 today; $25,000 in 1939, $78,232 today; $50,000 in 1939, $174,207 today; and $100,000 in 1939, $370,914 today.

Labmobile takes to the hills

Regular medical check-ups for several thousand employees scattered over 30 states. Sounds like a big order. Yet Phillips Petroleum Company, Bartlesville, Okla., is rolling merrily along on such a program. A mobile lab is the mountain that goes to Mohammed to detect illnesses causing lost man-hours.

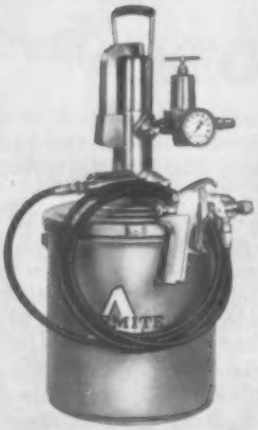
This doctor's office on wheels is fully equipped with the latest diagnostic instruments, including x-ray, electro-cardiogram and audiogram. It makes up to three grass-roots stops daily to visit pipeline crews or remote drilling sites. Or it may stay put for several months at a plant employing 1000 people. Complete circuit, covering over 3000 employees, takes about 2½ years.

The staff—a doctor and nurse-technician (husband and wife), and an x-ray and lab technician—conduct tests similar to those at the company's permanent medical department. Further treatment and diagnosis are recommended where necessary. Offered on a voluntary basis, examination is given to 90% of the employees at each stop.

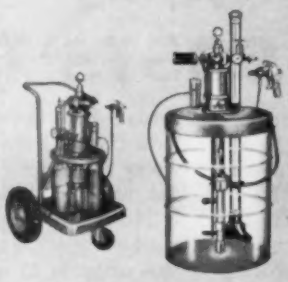
This is mobile lab No. 3—the others wore out from constant use. Built on truck-tractor body, it is furnished with a 3-ton air conditioning unit, a butane furnace, and a 300-volt generator. A castle among house trailers, the lab carries its own water tank which supplies both hot and cold variety when no trailer camp hook-ups are available.

NOW FOR LESS THAN $350*—A COMPACT, COMPLETE AIRLESS PAINT SYSTEM!

New Alemite 5-gallon Portable Hydrastat Model!



Model 707



Portable Hydrastat Spray Systems, with 24 to 1 ratio pump. Pumps from 1 to 10 gallon containers. Rolls as a unit—to work inside or out.

Alemite "78" Heavy Duty Pumps for use with 54 gallon openhead drums, standpipes and paint vats for production line finishing, or outdoor maintenance.

Here's the one-man, one-gun airless paint pump that goes everywhere—inside or out! Letting you quickly, easily spray paint on straight time without costly shut-downs. The Alemite "707" is lightweight (only 17¾ lbs.), has a handle for easy carrying, fits any 5-gallon paint container. It is precision engineered to operate at top efficiency all day with less than 7 c.f.m. of air.

The cost of this new Alemite "707" pump is surprisingly low—yet savings just *start* with the price! Hydrastat spraying cuts bounce-back because it uses no heat or atomized air. Paint goes 40% farther, goes on 80% faster for significant savings in materials and man-hours.

For more information on other Hydrastat models available contact your Alemite Representative now!

**Consists of pump, regulator assembly, filter, nylon hose with flexible static wire, gun and TC tip.*

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Symbol of SW Excellence

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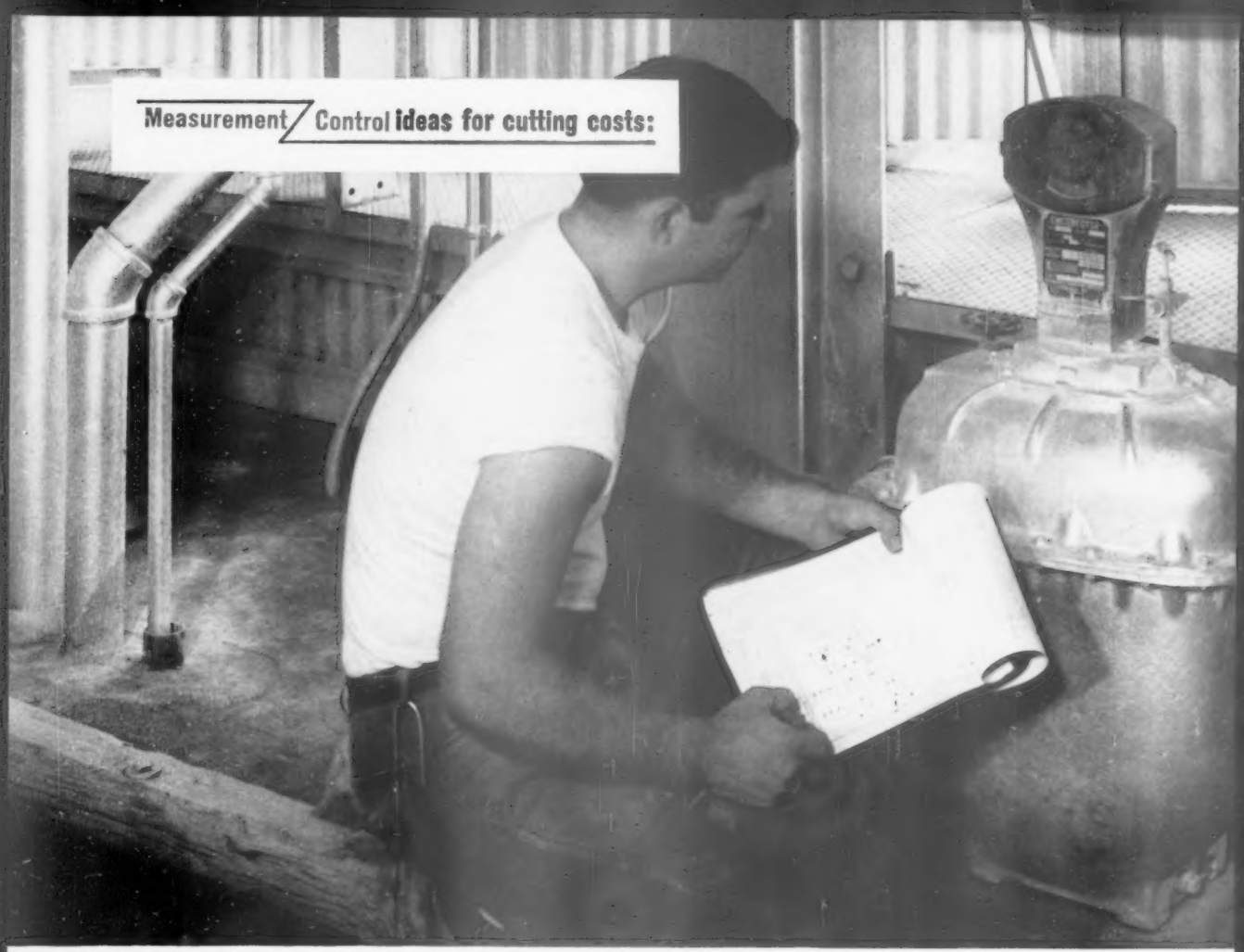

Couldn't "in-plant metering" HELP YOU CUT COSTS TOO?

Wherever things flow through pipe in your plant—whether as fuel, aids to production, or finished products—chances are that in-plant metering will be an immediately profitable investment. For example: above, you see Rockwell gas meters installed on individual enameling furnaces. The meters were recommended by a Rockwell field engineer as a fast, easy way of spotting furnace inefficiencies and preventing fuel wastage. Also, accurate fuel cost records of each operation were available for the first time—Cost Accounting Department figures were made more revealing.

In a bottling plant, another Rockwell field engineer recommended water meters to prove amounts of water actually bottled with product. The result: a sizable reduction in a sewage tax based on the premise that all water going into the plant would be discharged into the sewage system.

These are just a few examples of the many ways Rockwell field engineers are helping save time, money and material in a wide variety of manufacturing and process plants. These field men represent Rockwell's experience as the world's largest manufacturer of measurement and control products. Why not have a Rockwell field engineer visit your plant to explore new approaches to cost cutting through improved measurement and control? Send the coupon—there is no obligation.

ROCKWELL

The leading single source for Measurement / Control products and ideas

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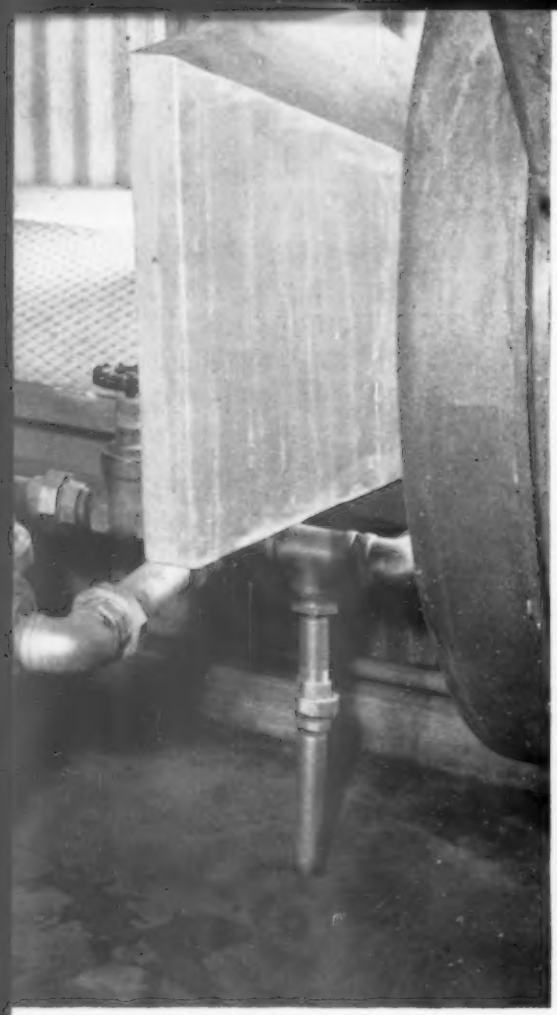


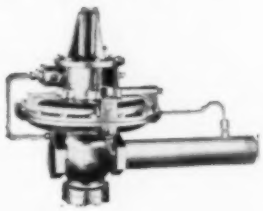
"IN-PLANT" METERING:

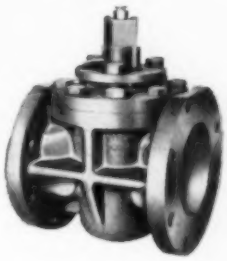
LIQUIDS AND GASES

"IN-PLANT" METERING can mean new cost cutting opportunities. Accurate liquid and gas meters are a positive way of improving cost control, insuring better use of materials, sharpening inventory control, and preventing waste. Whatever the need, Rockwell has the right liquid or gas meter to do the job better and at lower cost.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





CONTROLLING PIPED MATERIAL more efficiently is a positive step towards cost cutting. Better valves can save wasted products and materials and often increase plant safety. Gas pressure regulators can cut costs by assuring safe, economical use of any gas used in the plant. Rockwell has the world's most complete line of flow control devices.

HOW MUCH COULD YOU SAVE?

There is hardly a plant anywhere—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. Certainly it's worth investigating—especially since it will cost you nothing to find out. Simply mail the coupon now.

SEND COUPON NOW!

MEASUREMENT & CONTROL DEVICES

another fine product by

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Rockwell Manufacturing Company, Dept. MC1F, Pittsburgh 8, Pa.

Please send me literature as checked:

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By Paul Ruig, Member, New York Bar

When the union wants to look at your books

The union does not enjoy the Divine Right of Kings when it comes to making you prove "inability to pay." Act in "good faith," but don't be bullied.

NEWS TIPS

• Chances are you are bound by an arbitration award even though the NLRB may have jurisdiction over the subject. Said the NLRB recently: "The Board is . . . not bound as a matter of law by arbitration awards . . . But it will not interfere in disputes where arbitration proceedings have been fair and regular, all parties had agreed to be bound by the decision of the arbitrator, and the decision is not clearly repugnant to the purposes and policies of the Act."

• You can protect your workers from union discipline. Loyal employees desiring to pass a picket line cannot if the union threatens to discipline them for it. One employer *insisted* on a clause forbidding union discipline in such cases. A refusal to bargain in good faith, ruled the NLRB. It's not, overruled a Federal Appeals Court at Chicago. Employers have the right to insist upon such a clause.

• Here's a type of clause to stay away from: "The union has the right to grieve on the grounds that the company has failed to buy insurance covering the benefits set forth in the contract or insurance booklet." Such a clause might require you to put up where the insurance company finds small print relieving *it* from paying up. For example, it may agree to pay non-occupational accident bills, but argue that injuries resulting from a plant fistfight are not "non-occupational." Your company may then be compelled to pay out of its own pocket.

"We can't afford it" is a good response to a union demand for a wage increase, provided you can successfully shake off the union's demand for a close look at your books. And, contrary to popular opinion, a company need not go hog-wild in throwing its books open.

This recent case makes it clear that there are limitations on what the union can legitimately ask for—that you are not compelled to prove your inability to pay to the *union's* satisfaction.

Limitations on the union's right to look at your books stems from the United States Supreme Court decision in the Truitt case. The basic law runs like this: "Where an employer claims financial inability to pay . . . his failure to furnish on request substantiating financial information may constitute a violation of Section 8(a)(5) depending on the facts of the particular case." Notice that word "may." The ultimate inquiry is "whether or not, under the circumstances of the particular case, the statutory obligation to bargain in good faith has been met."

The most recent NLRB decision on the subject picked up the Supreme Court's Truitt rule, and explained it this way: "Under the Truitt principle, the obligation to furnish substantiating evidence does not automatically follow a claim of inability to pay, nor is the employer obligated to substantiate the claim; it is enough if the employer in good faith *attempts* to substantiate it." In the situation before the NLRB, the employer had volunteered to make his books available to the union under these conditions:

- They must be examined in the company's office.
- No information about customers or suppliers must be taken out.
- Any questions must be asked of the company's accountant.
- The union must bear the expense of the audit.
- Whoever looks at the books for the union must be a licensed public accountant or a CPA.

What motivated these restrictions? The company explained that if the union learned of the firm's sources of supply and its customers, there might be secondary boycotts. The company felt that a professional accountant would have kept things confidential. But this didn't tie in with the union's ideas. It wanted to be present when the books were examined. However, the NLRB felt the company had satisfied its obligations under the Truitt doctrine. The conditions were not unduly burdensome or restrictive on the union.

Other cases since the pace-setting Truitt decision have also placed limitations on the union's right to demand information:

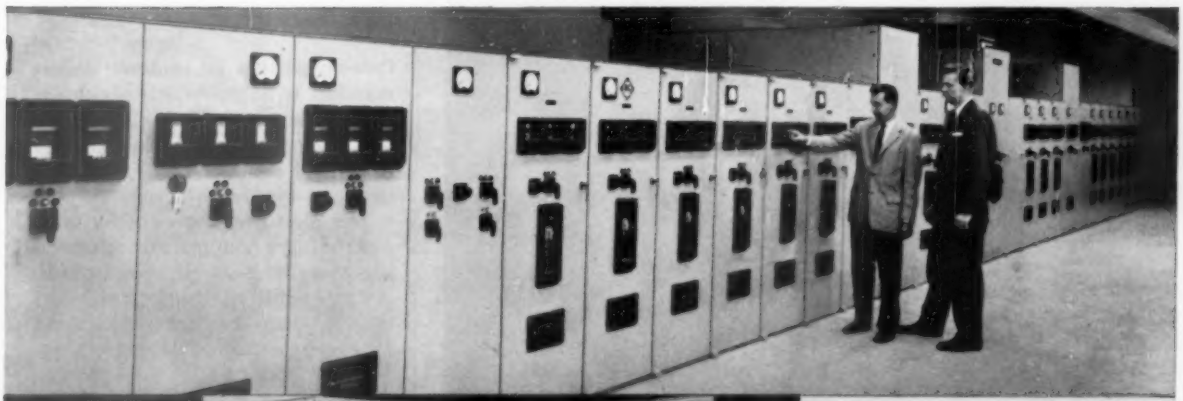
. . . *Whitin Machine Works:* The union must pay the extra cost involved in gathering the data.

. . . *Westinghouse Electric:* There's no need to furnish figures if getting them would be unduly burdensome.

. . . *American Cyanamid:* It's okay to insist that job evaluations and descriptions not be taken out of the plant, if your competitor might thus learn of confidential operating techniques and knowhow.

Turn the page

ALLIS-CHALMERS



▲ 4.16 kv metal-clad equipment serving a west coast city.

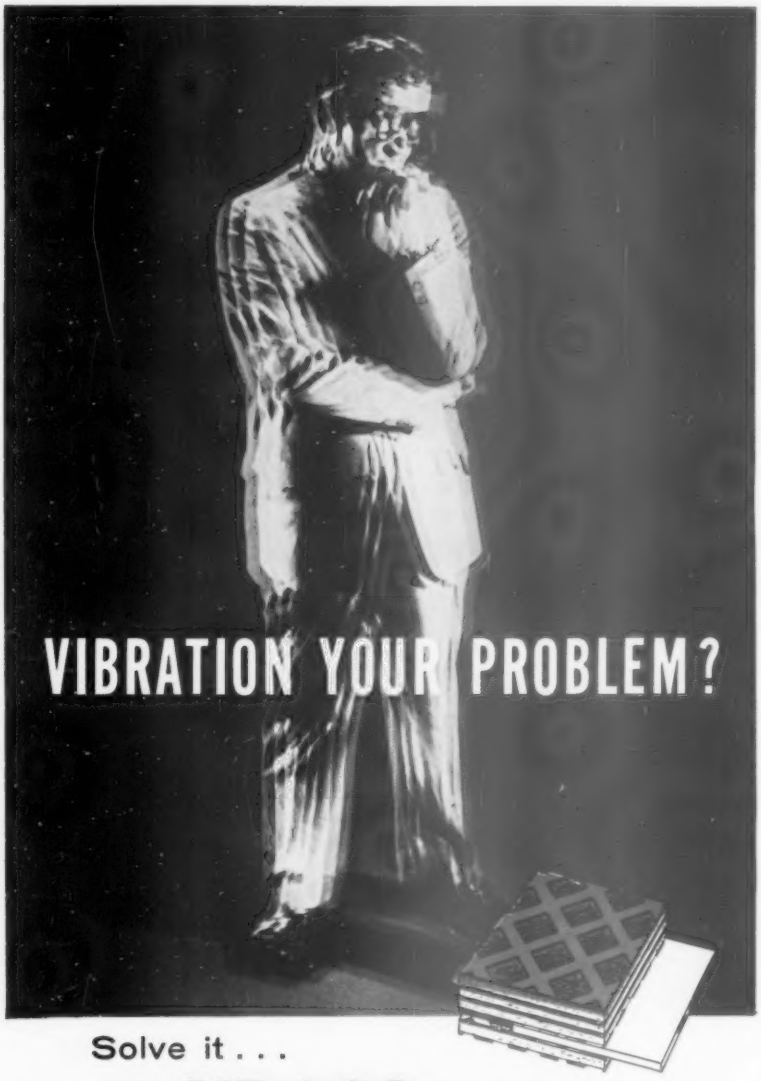
1. Separate compartments for current transformers.
2. Full panel metering and relaying.
3. Double-lock panel for operator safety.
4. Easy service accessibility without dismantling.
5. Glass polyester insulation throughout.
6. Separate up-feed and down-feed cable compartments.
7. Fully cast, trunnion-mounted potential transformers.

Lowest height, easiest access

the only switchgear with fully isolated current transformers

The front-accessible current transformers can be inspected, maintained or replaced without exposure to any high voltage compartment. A-C metal-clad units are just 72 inches high — means eye-level instrumentation . . . shoulder-height accessibility of component parts. And the entire panel can be used for meters and relays. Maximum compartmentation and dead-front construction offer greater safety. Buswork and components arranged for easy addition of future units.

You get rapid, one-stroke insertion of the circuit breaker. The breaker has glass polyester insulation for highest impulse strength . . . the only self-locking protective barrier . . . four-bar linkage is mechanically, electrically trip-free. Primary disconnect fingers eliminate use of garter springs, and are on the circuit breaker for easy inspection. Both stored energy and solenoid operators are available. *For more switchgear information contact your nearby* **Allis-Chalmers** *office.* A-1457



Solve it . . .

with **AIR-LOC** Mounting Pads

For isolating and dampening vibration, Air-Loc is the answer. In actual production tests, it successfully reduces vibration up to 85%. Air-Loc is easy to install in a matter of minutes. It can be quickly shimmed for leveling, gives permanent machine alignment . . . and is re-usable.

The scientific cross-grid embossing of Air-Loc machinery pads literally anchors your machines to the floor . . . without cement, without bolts.

Air-Loc is made of three materials, and each plays its part in giving you the ultimate in easy, yet positive machine mounting:

Cork — absorbs vibrations, shock and noise. The cork used in Air-Loc is specially processed, under patents, to bring out its best physical properties.

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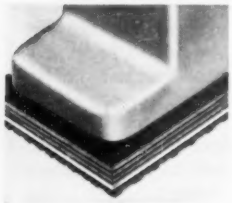
Vinyl — completely surrounds the cork and sisal to give exceptional durability and permanent resistance to oils, alkalies and acids.

Write today for full information and sample.



Air-Loc® DIVISION

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Begins on page 192

LABOR RELATIONS

A lesson in contract draftsmanship

One-upmanship in contract draftsmanship is an art worth acquiring. What's the trick? Here's a vacation pay clause that will illustrate the fine art of contract-clause construction and drafting.

Not for Christmas—but for now: For the labor relations executive who has everything—arbitration awards. Awards rendered in other companies describe their mistakes in contract language and how arbitrators (in their gamesmanship) have treated these clauses. The awards act as guideposts for those who want to avoid similar mistakes.

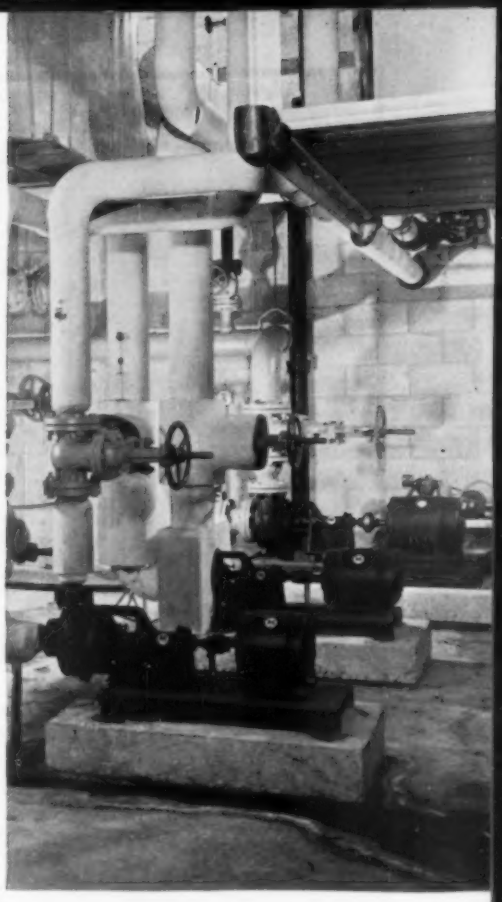
Here's the case of an employee who resigned on Aug. 3, 1960. He had not taken his 1960 vacation, so he claimed pay for it on a pro rata basis. He had not then taken his 1959 vacation either, so he claimed pay for that, too. The company refused to pay him in both instances, pointing to a clause that read: "Any employee quitting his job . . . shall forfeit all rights accumulated during his employment."

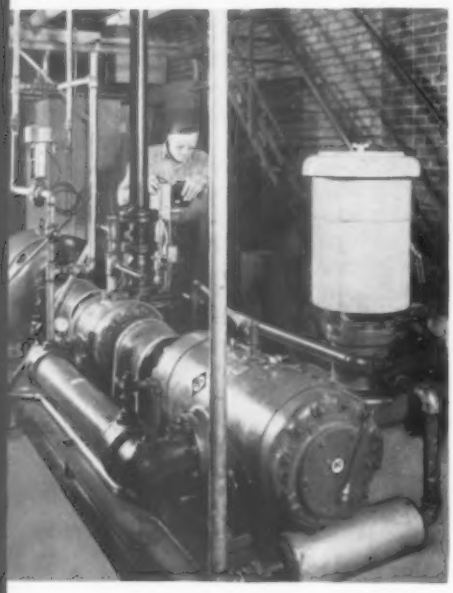
General lesson No. 1 in clause construction taught by this arbitration award is: "Courts and arbitrators have been reluctant to declare and enforce forfeitures if by reasonable interpretation they can be avoided." This means that the party urging a forfeiture has the burden of proving that forfeiture was the unmistakable intention of both parties, and this means the clearer the contract language, the easier the proof. This in turn means that each word in the forfeiture clause must be clear as a bell. They weren't in this case. To begin with, what "rights" were to be forfeited under the clause? The company argued that "all rights" is an all-inclusive term and should be given a broad interpretation.

General lesson No. 2 here was: "A catch-all or all-inclusive phrase is to be narrowly construed and limited to the subject matter to which it explicitly and unambiguously applies." Applying this rule to the case before it, the panel noted that the forfeiture language was in the discharge sec-

ideas and news

New era of quiet in cooling: Smooth-running Allis-Chalmers pumps and motors "speak" with a whisper . . . circulate chilled water silently for air conditioning hospitals, schools, shopping centers or office buildings. Quiet operation is a result of the extra attention to detail given in manufacturing and testing. One example is the sound analysis laboratory where exact sources of unwanted vibration can be pinpointed, new design concepts developed.





More air . . . less wear with vibration-free compressor: RO-FLO compressors with sliding-vane rotary design eliminate efficiency loss inherent in reciprocating-type machines. Centrifugal force keeps vanes in close contact with cylinder walls, automatically compensating for wear. Rotary action reduces the number of wearing parts to three . . . blades, bearings and seals . . . maintenance is minimized. You get many other advantages with this rotary compressor from A-C. Compact design minimizes floor-space needs. Lack of vibration simplifies foundation needs and gives you pulsation-free air. Operation is so smooth you can stand a coin on edge atop a RO-FLO compressor operating at full speed. For constant, dependable operation, choose the RO-FLO compressor. Single-stage units are available for pressures to 50 pounds gauge. Two-stage units to 125 psig.

No bake-out for wet motor: This SUPER-SEAL motor, installed in a low-lying work room of a Connecticut paper mill, has repeatedly been under 5 to 6 feet of water. When the flood water recedes, the motor goes back into service without costly, time-consuming "bake-out." POXEAL and SILCO-FLEX insulations, used in SUPER-SEAL motors, are impervious to moisture, dust, dirt, oils and most acids and alkalies.

To put productive ideas like these to work . . . see your Allis-Chalmers distributor

Silent pumps for air conditioning . . . motors that shrug off floods . . . compressors that defy wear. These examples demonstrate the extra value that is standard with A-C . . . the greater efficiency and added productivity which are yours when you buy A-C products, systems and services. Call your nearby Allis-Chalmers distributor for details on A-C "worth-more" features. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Some franchises are available for A-C compressors, motors, control and pumps.

ALLIS-CHALMERS PRODUCTS FOR INDUSTRY: compressors, controls, coolers, crushers, earth-moving equipment, engines, generators, industrial systems, kilns, lift trucks, mills, motors, pumps, rectifiers, screens, switchgear; thermal, hydro and atomic electrical generating equipment; transformers, unit substations.

Ro-Flo, Poxeal, Silco-Flex and Super-Seal are Allis-Chalmers trademarks. A-1498

ALLIS-CHALMERS

H-30 PAYLOADER®

Photo courtesy Freeport Sulphur Co. — a 10-year PAYLOADER user.

for tough bulk-handling jobs

The Model H-30 was introduced a year ago and has been so successful that many owners have already purchased additional units. Although it is the smallest 4-wheel-drive "PAYLOADER", it has an operating capacity of 3,000 lbs. and the latest improvements and features found in the larger models—is way ahead of all other loaders near its size.

Traction and Digging Power: 77½ h. p. gasoline or 71½ h. p. diesel power and 4-wheel drive on big 12:00x24 tires, plus torque-proportioning differentials give it outstanding digging and *go* power indoors or out.

Fast, Safe and Easy Operation: Full power-shift transmission plus torque converter give 3 speed ranges in each direction up to 25 m.p.h.; instant on-the-go fingertip shifting (no foot clutch); power-steer; safety boom arms (all moving parts ahead and clear of the operator); sealed 4-wheel brakes (hydraulic) give positive braking and low maintenance; "operator's choice" dual brake pedals permit braking with and without transmission engaged.

Fullest Operator Visibility: Simplified boom design and slope-down front end let operator see the bucket action at all times and give him excellent all-around visibility.

Easy Servicing, Low Maintenance: Battery, engine and other points easily accessible; sealed, pressurized hydraulic system plus double filtering.

The Tougher Your Bulk-handling requirements, the more you need "PAYLOADER" dependability. A Hough Distributor is ready to give you complete data on the H-30 or any other of the 20 models—from 2,000 to 12,000 lbs. capacity. He also has the finest service in the rubber-tired loader industry.

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☐ Send data on H-30 PAYLOADER
☐ Send data on other models and attachments

Name _____
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Company _____
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State _____

6-B-2

Begins on page 192

tion. Had it been in the vacation section, it would have been quite obvious, said the panel, that it was supposed to apply to vacations.

Moral: How you arrange provisions is important. Better to repeat yourself throughout the contract than to lose an award. But repetition in clause language may be avoided by definition clauses; for example, in this case a clause such as: " 'Rights' shall mean every right of the employee and shall include (but not be limited to) vacation, seniority, etc." Lawyers use phrases such as "but not be limited to," or "shall not limit the generality of the foregoing" to avoid the catch-all clause constructed by the panel.

Another word in the clause that was examined closely by the panel was "accumulated." Seniority, for example, is an "accumulating" item. Therefore, it can be forfeited under the contract. But the 1959 vacation was an earned or vested right, and, according to the panel, could not be "accumulated." Therefore, it could not be forfeited. But the vacation for the year 1960 was an "accumulated" item—and this could be forfeited, ruled the panel.

Retiring over-agers

Don't take it for granted that a pension plan that predates a union contract allows you to retire an over-age employee for that reason.

Under most union contracts, seniority governs lay-off. Discharge can be ordered for cause only. Being over 65 is not cause for discharge. And since such old-timers have top seniority, as a rule, they can't be laid off—unless you can retire them under the pension plan. Often, an arbitrator will not let you get away with this unless the pension agreement is expressly incorporated, by reference, as part of the union contract. Arbitrator Philip Neff was completely sympathetic with Telecomputing Corporation's thought of retiring some real old-timers in order to keep some of the younger fellows on the payroll. Meritorious, he said, but the union contract didn't spell it out that way.

Telecomputing protested that its

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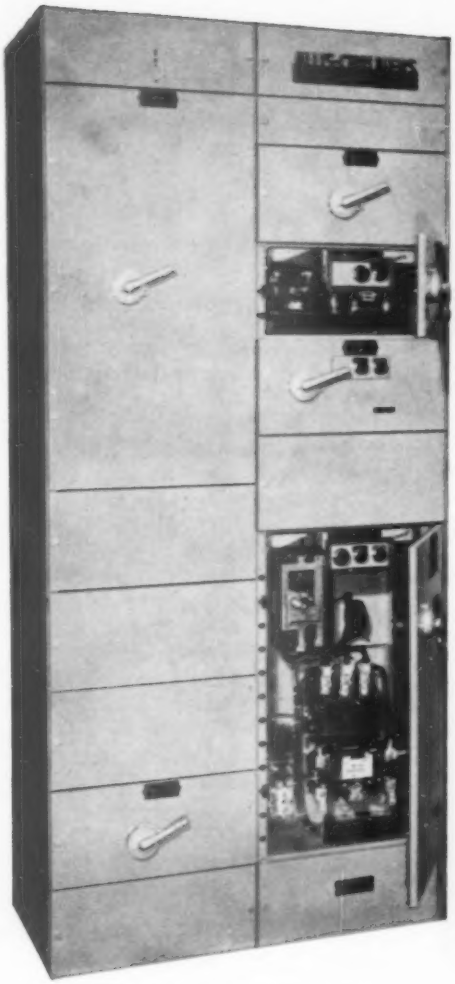
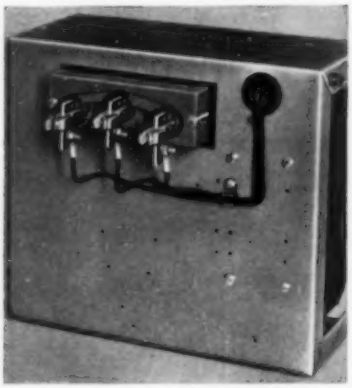
ALLIS-CHALMERS

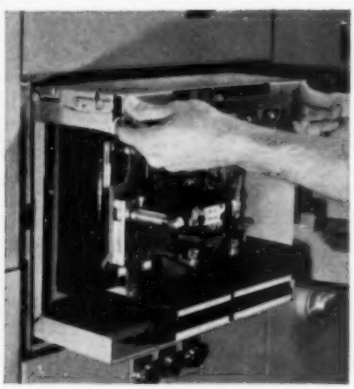


1. Centralized control saves space, cuts installation and engineering costs.

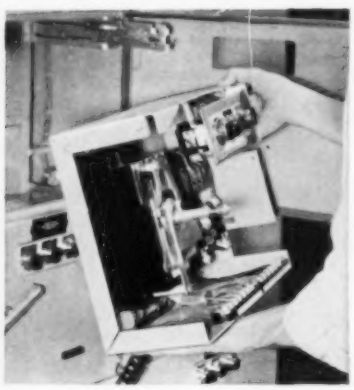
2. Exclusive plug-in terminal blocks permit removal of units without tools. Fully accessible location at front of units simplifies your wiring.



3. Extra heavy plug-in stabs and positive alignment provided by TRACK-GUIDE drawout mechanism assure trouble-free electrical connection.



4. With TRACK-GUIDE mechanism, units can be easily and safely de-energized and locked out, or withdrawn from enclosure for inspection and maintenance.



5. Units can be tilted up for inspection of stabs without removing from TRACK-GUIDE mechanism, or fully removed for bench maintenance or interchange.

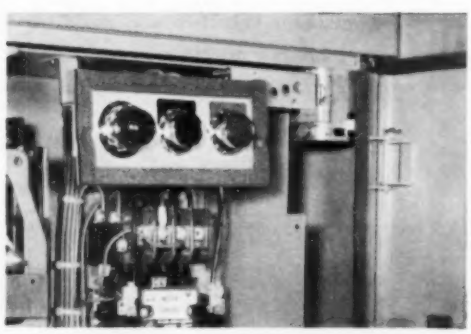
...six reasons why Allis-Chalmers new motor control center design is

the center of satisfaction

Satisfaction? It comes with every one of the new (yet fully proven) low-voltage control centers from A-C. Their clean lean design saves valuable space. Exclusive plug-in terminal blocks cut installation time . . . speed inspection and removal. *Track-Guide* drawout mechanism lowers maintenance costs. Control units can be drawn out, tilted up, or completely removed without tools.

Safety features of these new control centers provide *sure* protection to personnel. Units can be quickly de-energized for maintenance or inspection work. Units cannot accidentally fall out of *Track-Guide* mechanism during inspection or maintenance.

Reliability . . . versatility . . . economy . . . strength . . . safety. You name the feature — A-C motor control centers have it. *Ask your A-C representative or distributor for all the facts. Or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wis.*



6. Mounting of pilot lights and pushbuttons on the removable control units eliminates failures common with hinged wiring.

Track-Guide is an Allis-Chalmers trademark. A-1486

Is lost "coffee-break" time eating into your profits?

Here's how much just 5 minutes lost time a day costs per year for . . .*

Hourly Rate	50 Employees	250 Employees	1,000 Employees
$1.25	$2,656	$13,280	$ 53,120
1.50	3,180	15,940	63,760
1.75	3,719	18,595	74,380
2.00	4,250	21,250	85,000
2.25	4,781	23,905	95,620
2.50	5,313	26,565	106,260
2.75	5,844	29,220	116,880
3.00	6,375	31,875	127,500

*Based on 8 hour day, 5 day week, 255 working days per year, including overhead cost taken equal to hourly rate.

Series 1000
Maximum Security
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Begins on page 192

LABOR RELATIONS

employees knew about the retirement provisions of the plan, that inferentially it *was* part of the union contract, which post-dated the plan. Further, the plan was thoroughly taken up in a manual that was available to all employees. But Neff was a hard buyer, and said: "It is much too much to expect that employees will know of a practice through study of either a company policy manual or of a booklet describing a . . . plan that may have been shown to them and which they may not have read for many years."

What's the answer? Although some arbitrators may disagree with Neff's award, you'll be safer if you don't pussyfoot with the union. Include a clause in the union contract that in so many words will incorporate your pension plan provisions. If you feel this would be going too far, the next best thing is to continually remind your employees of your pension plan provisions by initially distributing a booklet describing its provisions, following up with bulletin board posters that will describe some of its provisions, and by reviewing provisions in the employee newspaper. Do this over a protracted period—particularly over a period that's long enough to include a union contract renegotiation—and an arbitrator like Neff might change his mind.

Reporting pay—on an icy day

Atlanta, Ga., residents ordinarily do not experience business-stopping ice and snowstorms. Hence, giving reporting pay to employees who showed up at company request on an icy, snowy day was a new experience for this southern steel mill.

Remember last February? Ice and snowstorms galore, plants shut down, the wheels of industry halted? Remember March of the previous year—1960? Probably not, but it was a month which Atlanta, Ga., residents will remember well because in that month occurred one of the worst ice and snowstorms in the city's history. It was also a month that an Atlanta employer will re-

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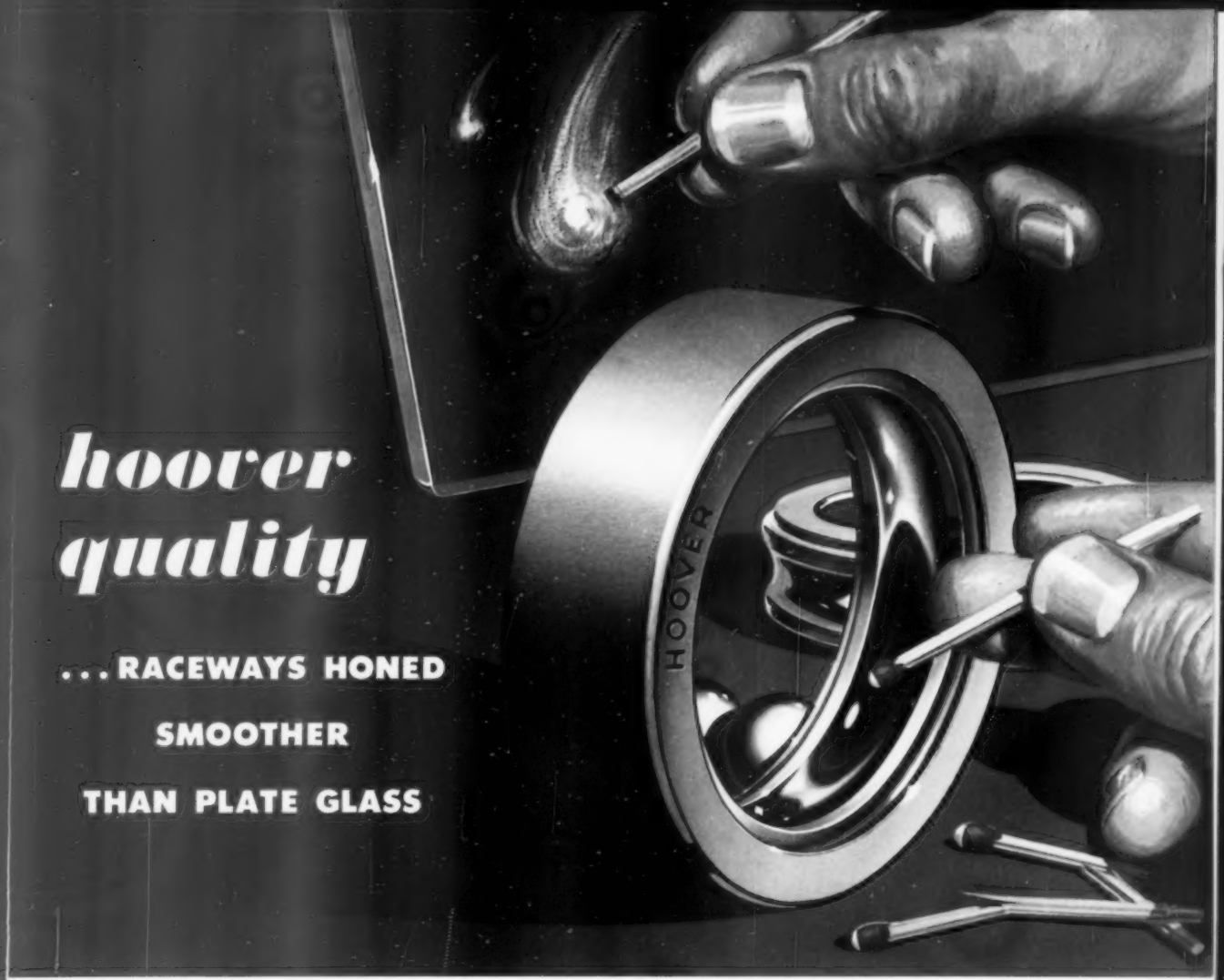

It's easier to strike a match on plate glass than on the smooth surface of a Hoover bearing raceway. A special process, developed and used only by Hoover, hones raceways until they are ultra smooth, superbly finished. With both inner and outer raceways *Hoover Honed* to microscopic perfection, Hoover ball bearings have a distinctive quality advantage.

Equally important as the *Hoover Honed* raceways are carefully matched sets of *Micro-Velvet* balls which are accurate within millionths of an inch. These precision components work together in hushed quietness, an excellent indication of bearing quality and a characteristic of all Hoover bearings.

Outstanding quality—*Hoover Quality*—pays off in longer life, greater load capacity and superior bearing performance in a wide range of applications.

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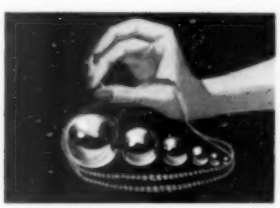
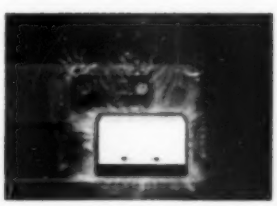
Hoover's Cuyahoga Steel and Wire Division produces quality chrome alloy steel wire from which balls are made.



Micro-Velvet balls are products of Hoover Ball Division plants in Middletown, Ohio, and Erwin, Tennessee.



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Hoover bearings in a wide range of types and sizes always measure up to high *Hoover Quality* standards.

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You bet, *plenty* strong enough! Why? Because this tape is *reinforced*, that is, steel-like fibers are sandwiched between layers of high strength kraft paper.

What's it mean to you? Just this . . . you can seal your cartons *faster* . . . 66⅔% faster than by the usual method of using six strips of ordinary tape. This two strip method of sealing with reinforced tape is approved by rail, air and truck carriers.

This labor-saving idea can mean economies in your shipping room with no sacrifice in quality whatever. In fact, *your customers* will like this improvement as it means speedier and safer opening and greater carton re-use.

For a sample of this amazingly tough tape and additional information, write American Sisalkraft at Attleboro, Massachusetts.

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LABOR RELATIONS

member well—the plant learned a lesson in labor relations.

Because of a midweek shutdown, management designated Saturday as a work day. Foremen called up as many workers as they were able to, and told them to come to work. The men contacted were asked to pass the word along to fellow workers. The local radio station made a similar announcement. But when Saturday came, only 37 out of 51 employees showed up—not enough to run the plant. After 30 minutes everyone was sent home. The company refused to give reporting pay to those who showed up, and marked the 14 who didn't with an unexcused absence. Grievances were filed.

Arbitrator C. H. Williams ordered the company to give the 37 workers reporting pay and ruled that the 14 should not be penalized for their absence because it was possible that all hadn't heard about the decision to work. Besides, he reminded the company, even if the word did get around, perhaps the men couldn't make it because of the ice and snow.

Jurisdictional disputes—Act II

The NLRB sends a case back for more evidence so it can follow the U.S. Supreme Court's order that it must decide jurisdictional disputes.

It wasn't long ago that the U.S. Supreme Court ruled that the NLRB must stop hedging in jurisdictional disputes. It was ordered by the court to actually *decide* which group of employees is entitled to perform the work in question. Before the court's ruling, under its age-old policy the NLRB merely had to decide whether an unfair labor practice had been committed. It did not solve the employer's quandary as to which union ought to do the work. The Supreme Court told the Board to *resolve* the problem, not just recognize it (see May FACTORY, page 250).

Knowing when it was licked, the NLRB wasted no time in following the court's mandate. It recently sent a jurisdictional dispute involving Safeway Stores, Inc., back to the

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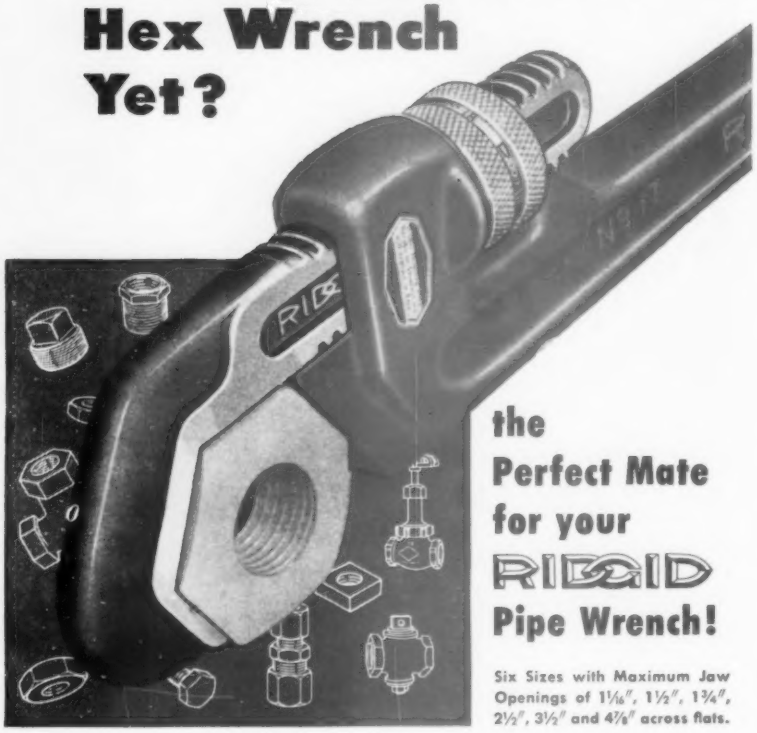

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From experience you know it's easier to work with the best of tools. Order your RIDGID Hex Wrenches from your Supply House today!

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Begins on page 192

LABOR RELATIONS

regional office to obtain evidence so that jurisdiction could be decided. In the Safeway case, members of Teamster Local 107 had struck and picketed a Safeway meat processing plant at Wilmington after the company had rearranged its trucking operations to use drivers of Teamsters Local 639 at Landover, Maryland, and Teamsters Local 660 at Kearny, New Jersey, to transport meat products from Wilmington to its locations for sale in the Washington and New York areas. The plot thickens.

Unemployment pay

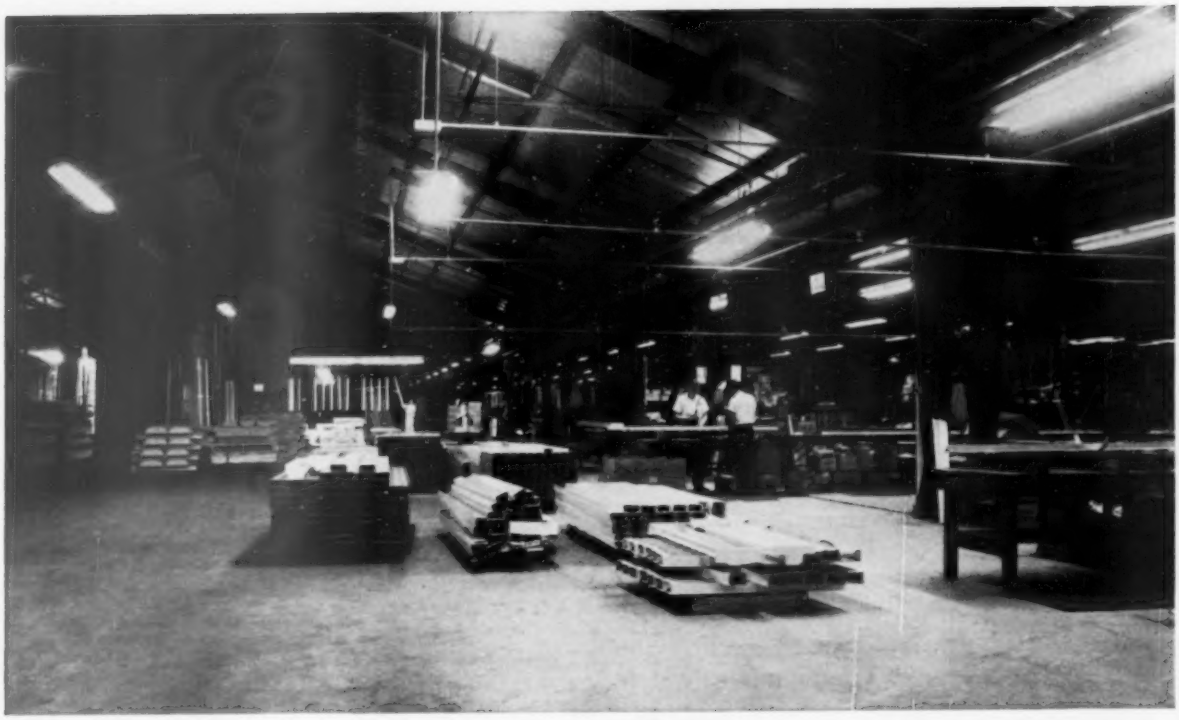
Overweight is a health and safety problem, argued the company. We shouldn't be stuck with unemployment insurance payments for this bird who "left" because he was overweight. But the referee thought otherwise.

The employee weighed 238 pounds when he was hired, but in the months ahead he put on 40 more pounds. Too much weight for just one person, advised the company's medical doctor. In his opinion, the employee's poor attendance because of a wrenched back and associated assorted ailments stemmed from his excess poundage.

Take a leave of absence and knock off those extra 40 pounds or you're through, directed the company. Apparently, he preferred to be through—and off he went to the nearest unemployment insurance office.

Now, under California regulations, an employee is not entitled to idle pay if he refused a leave of absence for reasons of health (because of TB would be a clear instance). But the State Referee ruled the employee's weight was not a health and accident hazard. His refusal to take a leave of absence was not a voluntary separation from the company. He collected his unemployment money.

(Items in this section are developed from full citations published by the Bureau of National Affairs, Inc., Washington, D.C., and from other sources.)



Light & Power Utilities' new 112,000-sq.-ft. quarters in quality Stran-Steel were built under Mississippi's "Balance Agriculture with Industry" Program. Architects: Lee, Brumfield and Riggens, Jackson, Miss.; Stran-Steel Contractor: Dixie Metal Buildings Co., Memphis.

Quality that lowers costs *every day of the year*

Working to fixed costs on tight budgets? Then see how Light & Power Utilities Corporation got space, style and savings in their new Stran-Steel plant in Olive Branch, Mississippi! This lighting equipment manufacturer chose Stran-Steel to get maximum clear floor space to house bulky painting and metal-working facilities and plenty of leeway for future expansion, too. Yet Light & Power's Stran-Steel structure cost them only $2.23 per square foot. It was erected in just 100 working days—about half the time conventional construction requires! Stran-Satin walls and roof panels, color-coated at the factory, saved $12,000 in painting costs. Complete insulation, so easily and economically installed in any Stran-Steel structure, cut gas heater requirements by 40%, lowering costs an additional $10,000. And the owners will save $5,000 every year in heating, as much as 15% in air conditioning costs! Your local Stran-Steel dealer will be happy to show you how you can have quality and lower costs, too. He's listed in the Yellow Pages under STEEL BUILDINGS or BUILDINGS, STEEL. Or mail the handy coupon below.

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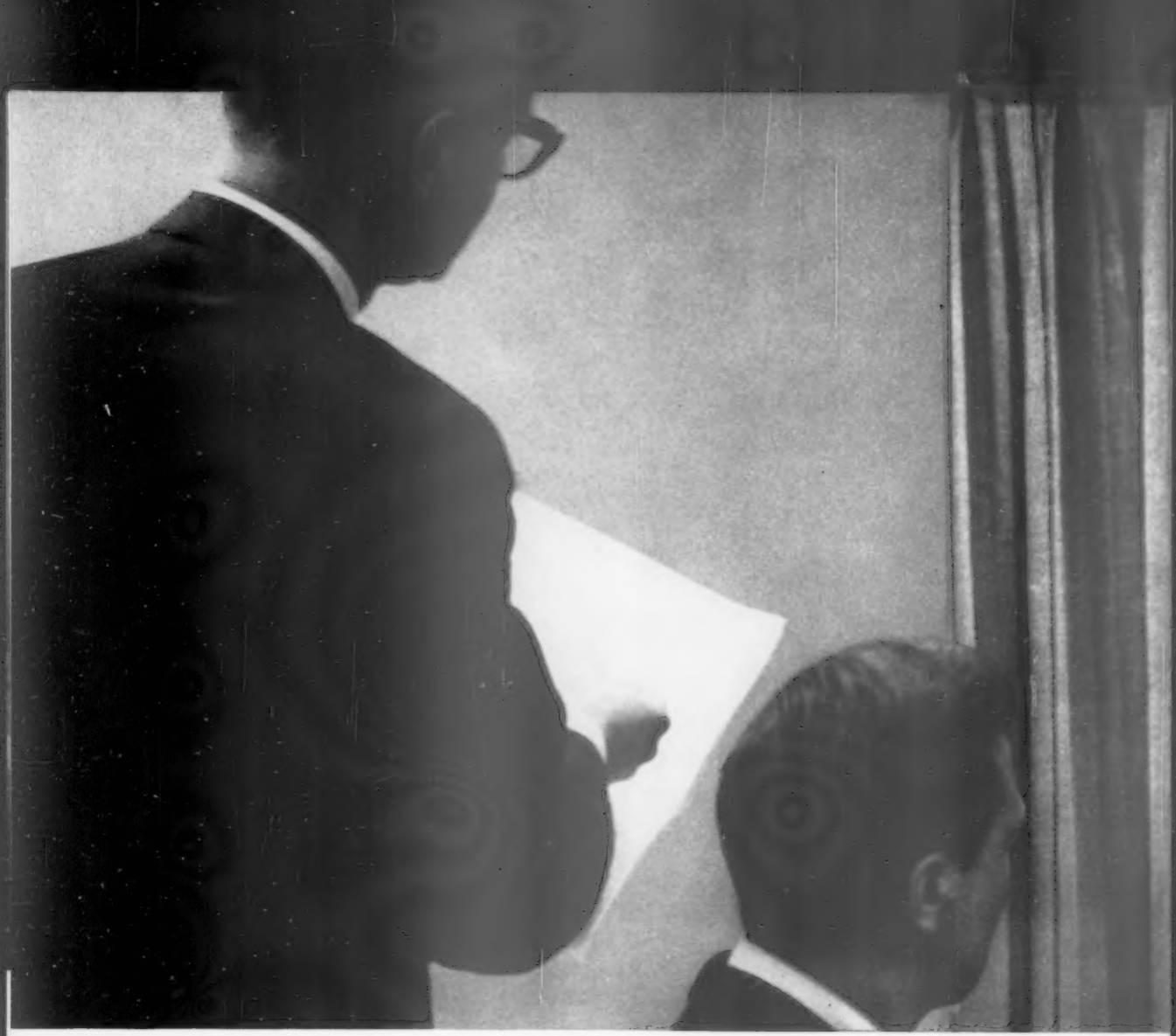


New IBM Inventory Management Simulator

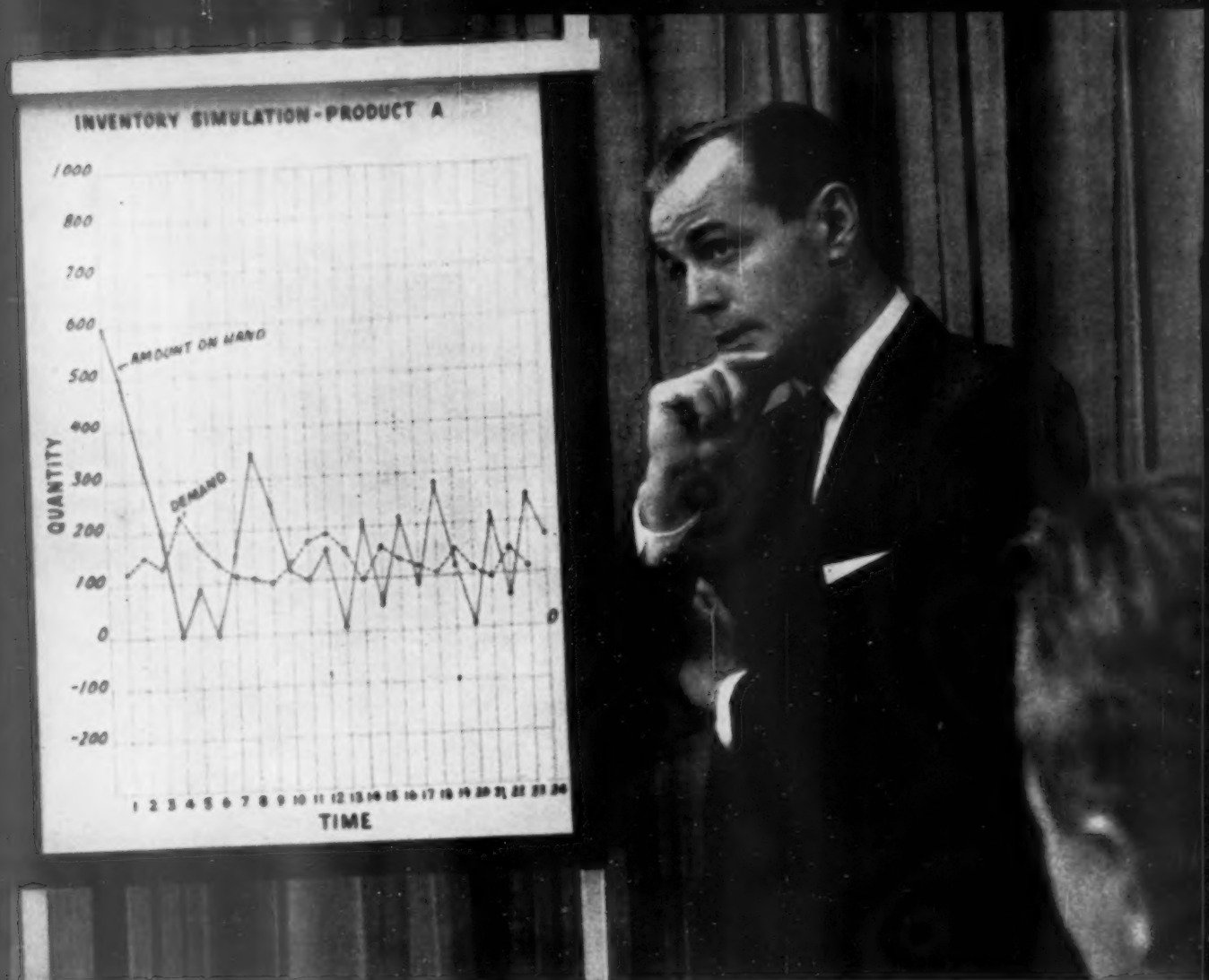
Management pre-tests inventory

How often have you wanted to peer into the future... see the probable results of your inventory policy? **Now you can.** An IBM data processing technique—Inventory Management Simulation—establishes the computer as an invaluable management tool for problem solving and decision making.

This technique lets you test and evaluate alternate plans electronically without disrupting present operations. In effect, it lets you turn *hindsight* into *foresight*.

Simulation is performed by creating within the computer a mathematical model of an inventory control system. Then the model is subjected to various demand situations. In every case, the computer reports what would have happened had this particular system been used to handle each situation. Of course, both the model and the demand factors can be endlessly varied.

Here's the important thing: Through simulation, the trial-and-error method of determining a course of action is performed within the computer—not during the course of your firm's business. This gives you a fast way to test plans under a wide range of conditions before actually putting them

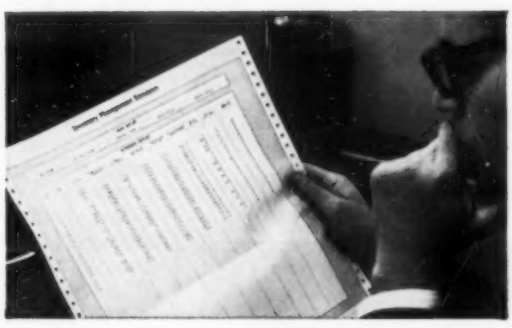


LOOKING AHEAD. Management has run a computer simulation of a proposed inventory plan. Company executives (above) now examine charted results showing how the plan might work, what problems might arise, where improvement might be sought. Print-out sheet (below) from an IBM computer contains facts needed to judge long-range results of a given inventory control plan. Inventory Management Simulation takes much of the guesswork out of planning.

decisions with electronic speed

to use. Unprofitable or inadequate courses of action show up in advance. You avoid them. And you select with confidence the system best suited to your firm's objectives.

Getting started. If you are an IBM customer, you can take advantage of the Inventory Management Simulation Program at once. IBM helps you collect the facts you need... and helps you set up a computer program to analyze them.

Ask your IBM representative to show you how this new technique can uncover *your* most effective inventory policy.

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HOW TO END WASTED INSULATION

What is the most economical thickness of insulation to use? It's a cost-juggling question, and a tough one, because getting the answer has always been a weary computation that has taken hours. So engineers have mostly been taking the easy way of precedent or rule-of-thumb, and either wasted heat or over-insulated.

Such waste or extravagance has now become inexcusable. Because anyone today—even a non-engineer—can figure the most economic thickness of thermal insulation on hot pipes or flat surfaces in less than three minutes. This has been made possible by the contribution to the general public of a 182-page manual by the Union Carbide Chemicals Company. The manual was unveiled recently under the sponsorship of the National Insulation Manufacturers Association (NIMA). Its title: "Manual on Economic Thickness of Insulation for Flat Surfaces and Pipes."

What this manual means to industry is highly impressive. A study by Union Carbide Chemicals, based on the new data, has shown realizable savings of up to $2 per foot of pipeline per year in its own plants. A comparison of insulation thickness prescribed by the new manual, contrasted with older UCC installations, reveals these statistics: Lines from ambient up to 700 F. (which comprise about 85% of the total), were found under-insulated by 30 to 50%. Lines over 700 F. had been regularly over-insulated. Overall, through use of the manual, UCC now expects to get 15% more usable energy from fuel consumed, and to reduce equipment sizes. Within 5 years it expects direct-dollar savings to reach $1-million annually, with further gradual increases reaching to probably several millions per year. When comparable savings are projected industry-wide, they can run from thousands to millions of dollars annually in companies where heat is an important cost element.

The manual is applicable to any type of plant anywhere. It can be used with any heat medium—steam, hot water, hot gas, electricity, or high-temperature media. Its advantages are not confined to chemical plants. It will save both investment and operational dollars wherever heat is a significant cost item.

To engineers accustomed to dealing with the old formulas, the new manual is a godsend. Heretofore, the calculation of the most economical thickness of insulation has required a laborious application of complex mathematical formulas. These are well known to engineers and have been published in manuals on the subject. But it would take an engineer with modern calculating equipment some 4 to 6 hours to calculate one thickness of insulation for one given set of conditions. Even the very few companies resorting to computer calculations have found the calculation unwieldy and expensive. The new manual gets the correct answer, with reasonable accuracy, in 2 to 3 minutes—without tedious and time-consuming mathematics or need of computers. Any junior technician can be easily and quickly trained to apply it.

Basis for the study that produced the new manual was the dissatisfaction of UCC engineers with the traditional rule-of-thumb methods of computing the most economical thickness. UCC had a big stake in finding a simpler way. Between 3 and 6% of the total cost of chemical plant construction of the parent Union Carbide Corporation presently goes into thermal insulation. Clearly the field of design, selection, and application of thermal insulation was a fertile field for improvement and economic analysis.

Development of the manual was directed by Frank Comerford, manager of engineering services (design and construction) of UCC at the corporate Technical Center at West Charleston, W. Va. A research team led by William C. Turner, staff insulation specialist, carried the project to its completion. It began in earnest in June, 1959, when a joint-study contract was entered into with the West Virginia University Experiment Station. This Station had been independently

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But . . . in many applications combinations of these factors exist. Or the liquid you want to pump is not clearly in either area. Then there are other considerations such as initial cost, operating cost, lubrication value of the liquid, location and even budget limitations.

All of these considerations can put you in the middle—where either a rotary or centrifugal can be used. The best choice can only be made by someone with experience and knowledge of both types.

As one of the few manufacturers of a complete line of both rotary and centrifugal pumps, Worthington can help you select the best, most economical solution to this perennial pump problem. For the name and address of your nearest Worthington representative, consult the yellow pages.

P.S. If you'd like a copy of a 50-page booklet, "Rotary and Centrifugal Pumps: Theory and Design," please write to Worthington Corporation, Section 20-14, Harrison, New Jersey, for bulletin G-2666.

WORTHINGTON

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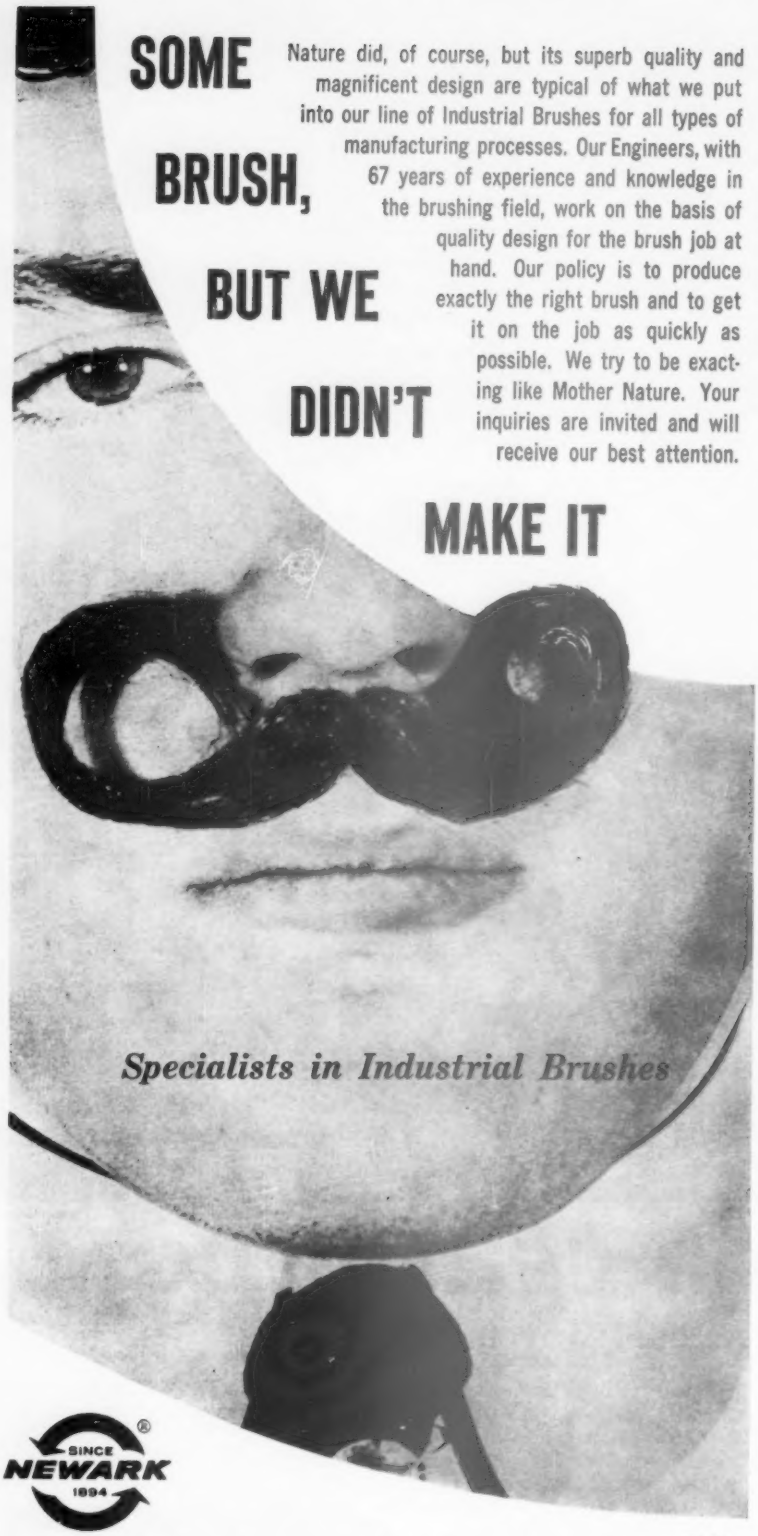
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WASTED INSULATION

Begins on page 206

considering a study on thermal insulation, and could make available an electronic computer. Its cooperation was invaluable.

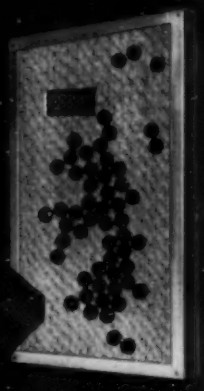
The new manual is based on the classic formulas presented to the A.S.M.E. by L. B. McMillan back in 1926. The team estimated it would require over 53-billion graphs to show every reasonable set of insulating conditions—costs, shape of insulation, conductivity, and temperature differences. By the unique development of five sets of charts (four are new), the team reduced to 141 tightly packed pages of graphs and tables, what would otherwise have required 1052 pages. This it did in 83 hours of computer time as against 500 man-years if the formulas had been worked on the fastest electric calculator. Its remaining 41 pages consist of introductory material and sample solutions to typical problems.

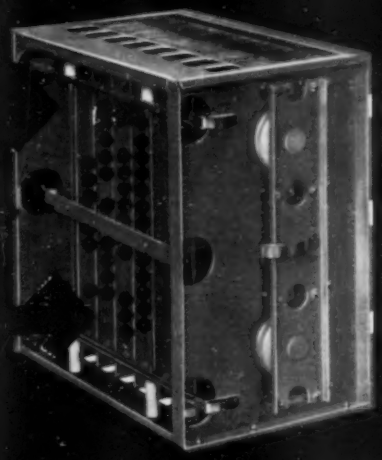
Only insulation of hot surfaces is covered in the manual. The team is now working on insulation of cold surfaces—down to minus 400 F.—and hopes to offer these companion data by early 1962. The manual does not prescribe the type of insulation. However, once you have chosen the material, it does give you the economic thickness.

The manual's charts and tables take care of any realistic combination of conditions, including possible increases or decreases of costs within the next 20 years. The data cover 22 pipe sizes (½ to 36 inches) and flat surfaces (greater than 18-in. radius). They provide for temperature differences ranging from 90 to 1314 F., and insulation conductivities (K values) from 0.10 to 1.5. And they cover any heat-using plant ranging in capital investment from $2 to $18 per pound of steam per hour.

Now the big question: Where can the manual be obtained?

Each member of NIMA already has a few copies for the use of its engineering staffs. And NIMA plans to issue the hot-surface manual at $10 per copy about June 15 for general distribution. In the meantime the data at hand are on view at NIMA headquarters at 441 Lexington Ave., New York 17.





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What it saves you

Time, money, effort. No time consuming drilling or plugging is required. There are no expansion bolts to insert. In some cases fastenings can be made every 15 *seconds*. Others take a little longer.

Five years of extensive use by contractors have shown that the fastenings made by this tool are at least the equal of those made by any other method. But it makes them faster and with vastly less effort. It's made by Ramset and it's the finest powder-actuated tool in existence.

Write for more information or call your local Ramset dealer. He's listed under "Tools" in The Yellow Pages.

WINCHESTER-WESTERN DIVISION Olin 288-F Winchester Ave., New Haven 4, Conn.

For more facts Circle 504 on Reader Service Card

PM* or REPAIR . . .

Avoid unplanned downtime . . . Keep rolling equipment on the move; keep stationary units and tools in operation by making necessary bearings replacements with New Departure Ball and Hyatt Roller Bearings. They have become the standards of the industry because of their reliability and long life under the most severe service conditions.

Whatever the reason for equipment being out of service and in the shop, the important thing is to get it on the job quickly and keep it working. New Departure and Hyatt Bearings help you do it. These top quality, precision bearings are close at hand through the national network of Authorized New Departure and Hyatt Distributors.

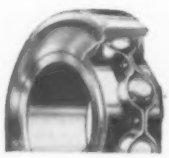
* Preventative Maintenance

HYATT roller bearings come in a wide variety of types and sizes from ¾" OD to 14" OD. They handle radial loads of up to 103,000 pounds, speeds as high as 50,000 RPM. Standard bearings operate efficiently from below zero temperatures to 450 degrees F. Special steels, if desired, push the temperature range higher.

METRIC SERIES . . . Precision roller bearings for transmissions and gear boxes with built-in extra capacity. Will handle heavy radial loads, with intermittent thrust loads.

WOUND ROLLER . . . Made in all sizes, operates with inner race or directly on shafting. Resists extreme shock, abrasion and fatigue.

NEW DEPARTURE ball bearings have a wide range of seals to retain bearing lubricants and keep out contaminating matter. Each seal is designed as an integral part of a bearing. The result is greater bearing efficiency, less downtime, longer life.



LAND-RIDING SEAL AND TRASH SHIELD . . . Excellent for severe contaminant conditions, moist or dry. Rubber is bonded to steel insert, crimped into outer ring.

LAND-RIDING SEAL, PRESSED . . . For severe conditions. Rubber is bonded to rigid steel "L" frame and pressed into outer ring ID for positive seal.

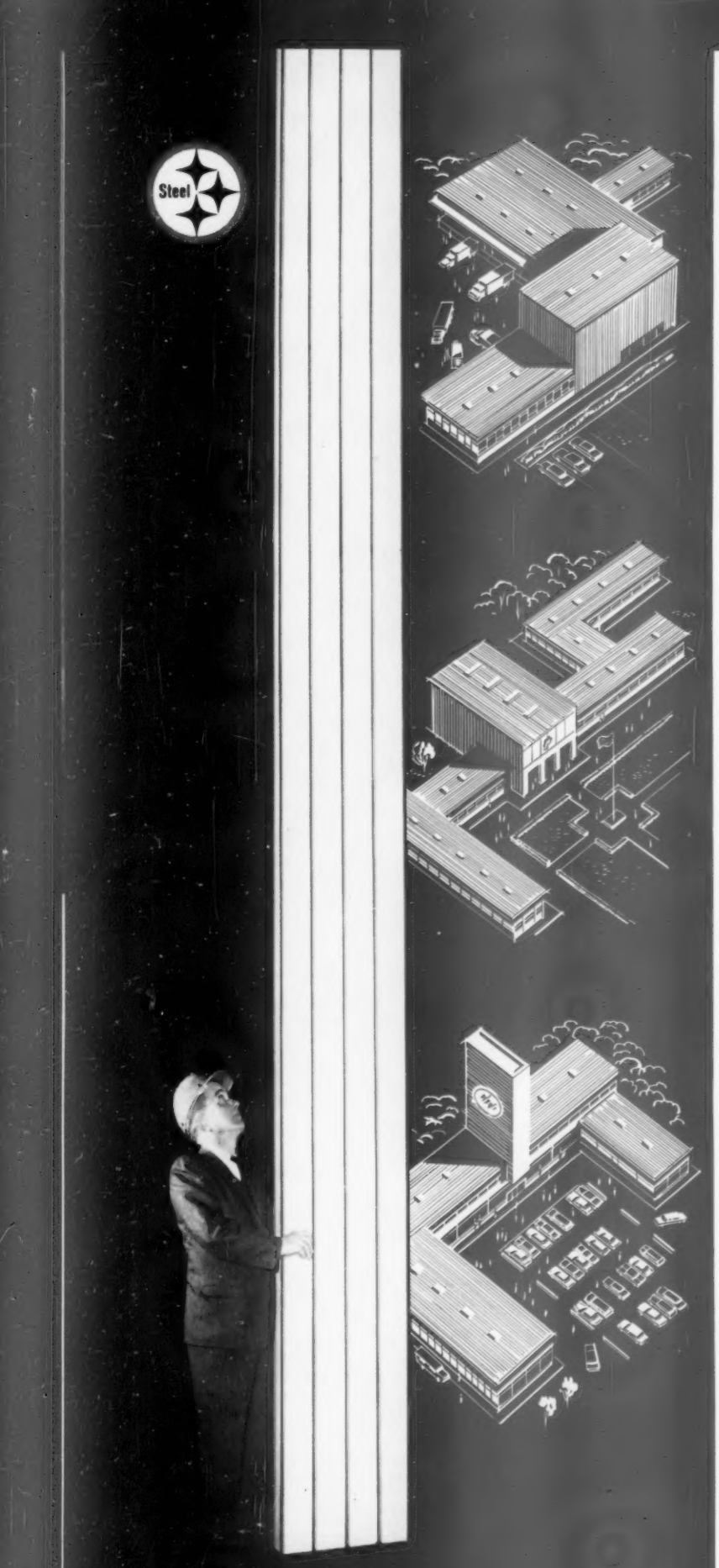
SENTRI-SEAL . . . Most popular seal in use today. For every contaminant condition. Metal insert, molded in rubber seal which has positive contact with ground inner ring groove.

HYATT NEW DEPARTURE

Available nationally through UMS Authorized New Departure and Hyatt Bearings Distributors

GM U-M-S PARTS SALES UNITED MOTORS SYSTEM

For more facts Circle 505 on Reader Service Card



NOW!
GET STEEL ROOF DECK IN LENGTHS UP TO 50 FEET

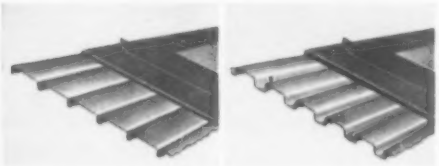
Here's good news for roof deck users! Wheeling's Super-Rib Steel Roof Deck now comes in any length . . . as long as a common carrier can handle it.

CUTS INSTALLATION COSTS! These extra-long lengths mean fewer end laps . . . fewer sheets to handle. And – because Wheeling's new design is so strong – you can now use Wheeling Super-Rib Roof Deck on continuous spans up to 12'-0".

SPECIAL PROTECTIVE COATING! Wheeling's new, improved steel roof decks have outstanding protection against weather, both during and after installation. First, they're Bonderized*; then they're *extra-protected* with a specially developed, roller-coated, baked-on gray vinyl primer!

Get the complete facts on both types of Wheeling Super-Rib Roof Deck . . . and the other fine Wheeling Products shown on the next page . . . from your Wheeling man this week. Or write Wheeling Corrugating Company, Wheeling, West Virginia.

CHOOSE FROM TWO TYPES!



Type "A" has narrow ¾" rib openings for greater adhesive contact . . . use with all types of insulation.

Type "B" has wide 2¾" rib openings for higher carrying capacity . . . use over longer continuous spans.

Wheeling
CORRUGATING COMPANY

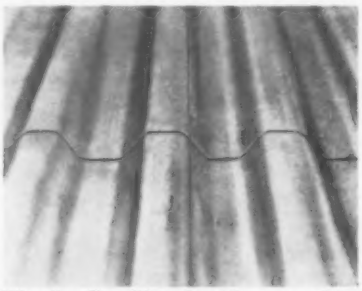
WHEELING CORRUGATING COMPANY
IT'S WHEELING STEEL! Warehouses: *Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Martins Ferry, Minneapolis, New York, Philadelphia, Richmond, St. Louis.* Sales Offices: *Atlanta, Houston, New Orleans.*

*Registered Trademark of Parker Rust Proof Company

Circle 506 on Reader Service Card

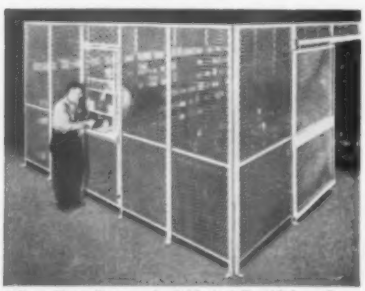
OTHER WHEELING PRODUCTS

Wheeling Continuous Weld Steel Pipe gives strong, dependable, low-cost service...usually outlasts the building itself.



Wheeling Tensilform®, with conventional or light aggregate concrete, gives structures excellent lateral stability.

Wheeling SofTite® Cop-R-Loy® Galvanized Steel Sheets, for heating and air-conditioning ducts, will not flake or peel under rough use.



Wheeling Expanded Metal Partition Systems prevent pilferage... yet allow free passage of light, heat, air and moisture.

CATALOG NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

MATERIAL HANDLING

1—Sling chains. Catalog No. S-261 (20 pages) describes maker's line of Cam-Alloy, wrought-iron, and high-test steel sling chains. Gives specifications and other details on sentry, standard, and customized slings. *Campbell Chain Co.*

2—Automated material control. This 8-pager (GEA-7130) discusses material handling automation systems. Defines concept of automated material control and lists the many benefits obtained from such systems. *General Electric Co.*

3—Measuring systems. Specifications, diagrams, and other data on load cell systems are given in 4-page bulletin (M-27A). SD series measures tension loads; SW, compression loads. Illustrates applications. *Martin Decker Corp.*

4—Material handling control. Here's an 8-pager (WR-3948), "Selector Systems," that describes two consoles (Elector and Mimic) for controlling distribution of materials carried on conveyors. *Control Design & Fabricate, Inc.*

5—Product control boxes. Lightweight, tough, easy-to-handle copolymer boxes are discussed in 4-page folder. Available in standard and special sizes, light gray or other colors, with or without dividers. *Export Corp.*

6—Trucksters. This handy-size, 16-page booklet (T100) analyzes operating and maintenance costs of these units for various applications. Includes 28 detailed reports on their operation and maintenance. *Cushman Motors.*

7—Rack systems. Catalog No. 111 (4 pages) describes Drive-in and Drive-thru racks for storage of loaded pallets and skids. Four basic units in standard sizes can be combined for many types of solid pallet storage arrangements. *Bernard Gloekler North East Co.*

8—Bulk handlers. "Notes on Totes" is a 4-pager that discusses filling, shipping, storing, and discharging of Tote bins. Come in aluminum, stainless steel, carbon steel, Monel, or magnesium; five standard sizes. *Tote System, Inc.*

9—Order picking control. Design and application details on distribution warehousing controls for case goods order picking are given in 8-pager (GEA7219). System operates from punched card or keyboard input. *General Electric Co.*

PRODUCTION

10—Photoelectric units. This 22-pager (No. 611) covers all phases of electric eye applications in automation. Tells history and development of electric eye. Shows miniaturized light sources, photo units, etc. *Photomation, Inc.*

11—Power tools. Catalog F14875 has 68 pages of information on over 100 power tools. These include three new worm-drive power saws, two-speed metal-cutting power hacksaw, all-purpose reciprocating saw, and others. *Skil Corp.*

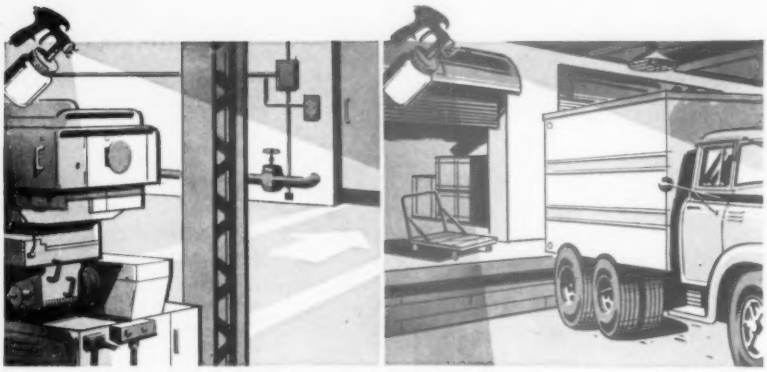
12—Arc welding. Bulletin 7000.7 (40 pages) is titled "Weldirectory of Arc Welding Electrodes, Equipment, and Supplies." Data on classification and selection of electrodes for every type of application. *Lincoln Electric Co.*

13—Weight-sensing systems. An 8-page manual (Form 3513) shows use of principle of weight sensing, or measurement of force, in many production and quality control functions. *Exact Weight Scale Co.*

14—Silver brazing alloys. This revised 24-page manual (ADC-847C) discusses brazing procedures, problems and solutions. Describes processes, design of brazed joints, and tells how to select base and filter metals to suit your specific needs. *Air Reduction Sales Co.*

Turn the page

Tough New Spray Enamel Dries in 30 Minutes!

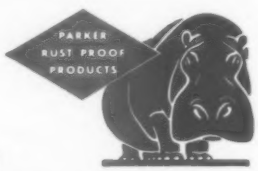


TROPICAL SPRAY RHINAMEL PROTECTS EQUIPMENT INDOORS OR OUT—FOR YEARS!

Now you can spray a new, hard-gloss enamel finish on machinery and equipment—and have it dry in 30 minutes. Tropical Spray Rhinamel is specially formulated to build a heavy protective coating on wood and metal that resists rust, corrosion, abrasion and weathering. Available in wide range of high-lustre colors. Mail the coupon below for full product information.

Also Available: Brush Rhinamel Bakelite reinforced provides extra heavy-duty wear for the toughest applications.

Rhinamel is a product of the combined research of Parker Rust Proof and Tropical Paint companies.



HEAVY-DUTY MAINTENANCE PAINTS SINCE 1883

TROPICAL PAINT COMPANY
1122-1232 W. 70th St., Cleveland 2, Ohio

SUBSIDIARY OF PARKER RUST PROOF COMPANY

TROPICAL PAINT COMPANY, 1122-1232 W. 70th, CLEVELAND 2, OHIO

Please send me full information on Tropical Spray Rhinamel

Company_____

Name_____ Title_____

Address_____

City_____ Zone____ State_____

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

15—Bending processes. Design features of presses for faster bending of parts made of tubing, pipe, rod, bar, and other stock are set forth in Bulletin 379 (12 pages). Presses are available in eight models. *Pines Engineering Co.*

16—Defoamer equipment. This 8-pager explains operating principles of new compressed air sonic defoamer. Each defoamer has own air pressure regulator. Includes specifications; shows methods of application to tanks. *Teknika, Inc.*

17—Prepregs. These pre-engineered materials for reinforced plastics and high-pressure laminates are discussed in 8-pager. Lists characteristics and applications. *Society of Plastics Industry, Inc.*

18—Color measurement. Two 4-pagers describe Green-Bartlett technique of high-speed fully automated color measurement. One booklet covers color sorting tasks; the other, details of the colorimeter. *Allied Research Associates, Inc.*

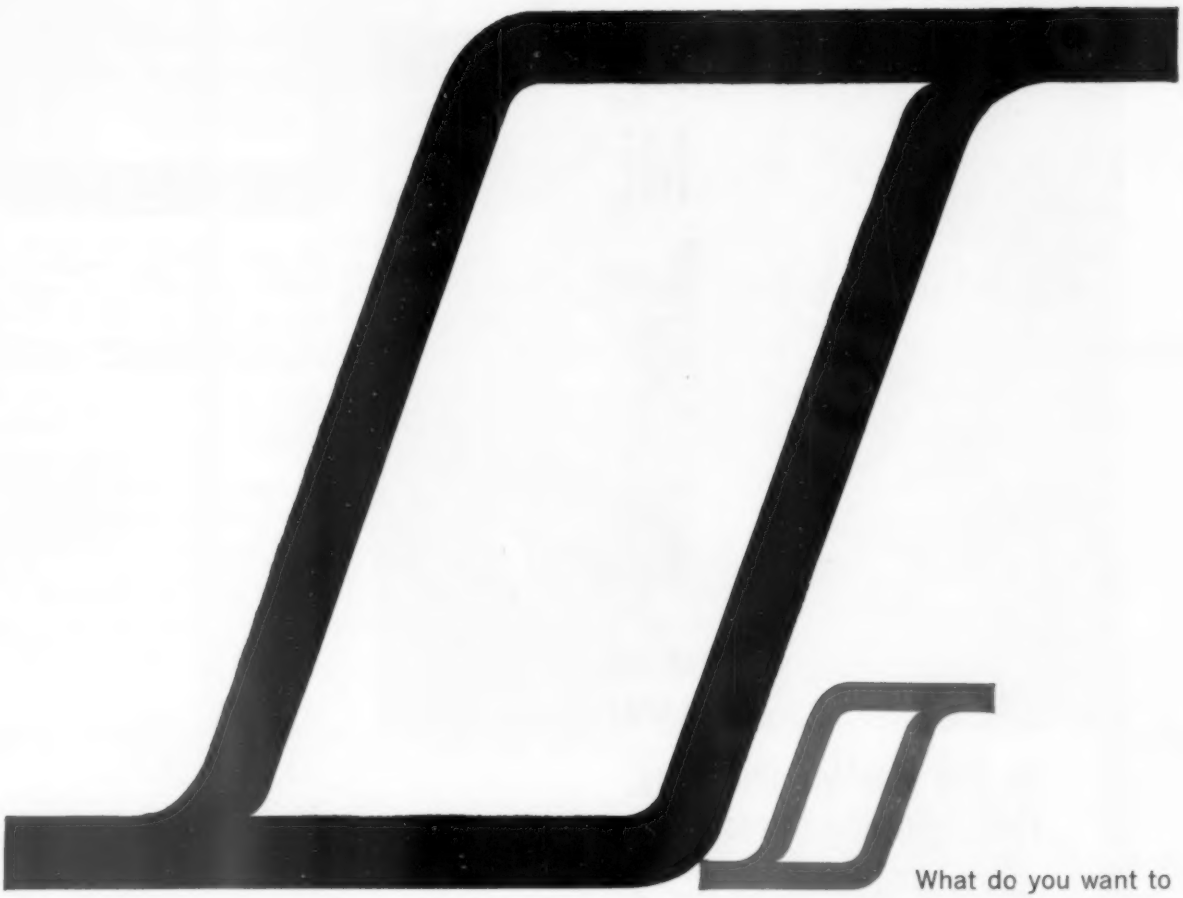
MAINTENANCE

19—Pulling system. Booklet No. PS-1 (pocket-size) describes system and how it solves everyday pulling-installing problems. Shows four basic tools. Tells how to apply hydraulic power to pulling problems. *Owatonna Tool Co.*

20—Safety climbing device. Here's an 8-page catalog that presents a safety device for vertical climbing. Explains how device is attached to structure—climber can go up or down safely without using hands. *Safety Tower Ladder Co.*

21—Cleaning machine. Whatever your cleaning and maintenance may be, the Tornado 400 will meet them easily, economically. Booklet No. 1032 (20 pages) describes many uses. *Breuer Electric Mfg. Co.*

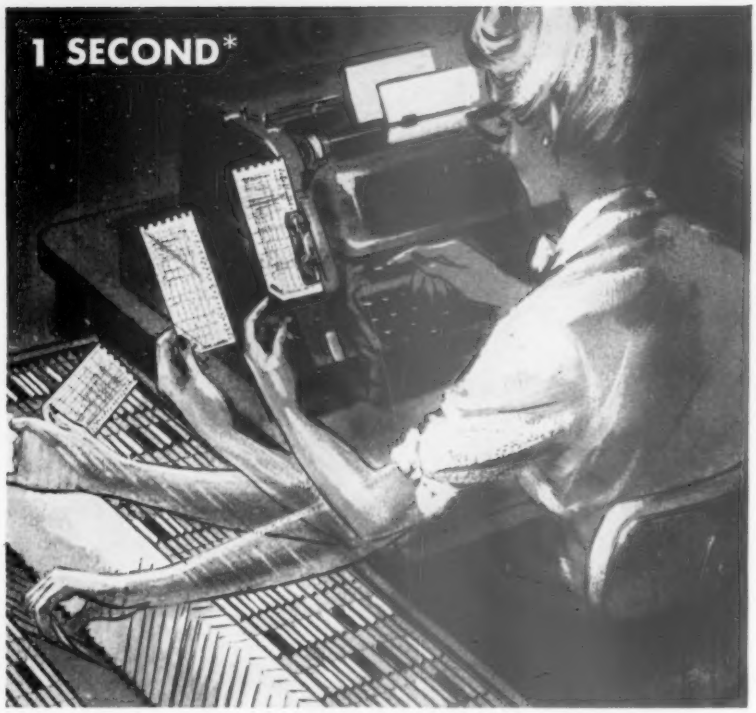
Turn the page



What do you want to control? The flow and measure of 20,000 amperes in an aluminum ore processing plant? (A large static control system will provide pinpoint control—and eliminate the need for direct connections between meter panel and bus bar.) Or do you want to supply exact change in an automatic bill-changer? (A small static control system will do this—and detect counterfeits to boot!) Large system or small, static control can be the answer. ■ We show large and small hysteresis loops ⎍ to define these systems as *magnetic* static control. Such systems have no moving parts (static), and under normal operating conditions will never burn out or wear out. There is virtually no maintenance needed, almost no heat loss, and fewer components than in conventional systems. Static control systems are used on automobile assembly lines, for annunciator systems, and for controlling the speed of 1/20-hp motors. If you, too, would like to learn what your operating statistics and costs could be by using magnetic static control, write to Magnetics Inc., Dept. **F-87,** Butler, Pa.

INDUSTRIAL CONTROL EQUIPMENT

MAGNETICS inc.



No idle machine time here.
Time from file to reading head—

*One second!**

VISIrecord's split-second record location has gained international recognition as "the world's fastest record-keeping system."

VISIrecord speed and convenience, minimizes floor space requirements, operator fatigue—and increases productivity and accuracy.

VISIrecord speed eliminates costly idle machine time on automated applications, and complements machine efficiency—the programmed edge-punched card input easily keeps pace with the most modern machines.

VISIrecord's split-second refiling, accomplished during machine's operating cycle, eliminates idle machine time.

Your VISIrecord Systems Specialist is ready and able to provide proof of related accomplishments achieved by thousands of satisfied customers.

Meanwhile write for Case Histories and list of satisfied companies in your industry.

*Observation of experienced operators by General Electric Co. Receiving Tube Dept.

VISIrecord, inc.
375 PARK AVENUE, NEW YORK 22, N. Y.

VISIrecord

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Systems Specialists in Principal Cities

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

22—Fire fighters. Original high-pressure fog and its effectiveness in fighting fires is explained in this 16-page catalog. Includes specifications and performance data for in-plant stationary, mobile, and other equipment. *Food Machinery & Chemical Corp.*

23—Working platforms. Two 4-pagers describe equipment for overhead operations. Move-On self-propelled staging eliminates climbing up and down. The Spaceman is a go-anywhere working platform—comes in four sizes. *Anderston Clyde Inc.*

VALVES, PIPES, AND FITTINGS

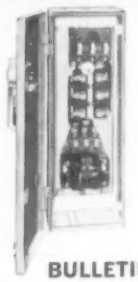
24—Plug valves. Installation and operation details on Rolotork cast steel lubricated plug valves are given in 16-page brochure. Explains use of ball-bearing system to handle high-pressure line thrust on plug. *Walworth Co.*

25—Pneumatic products. Catalog No. 1000 (64 pages) describes compressed-air-line filters, pressure regulators, air-line lubricators, valves, and other products. Includes dimensional data, flow chart, photos. *C. A. Norgren Co.*

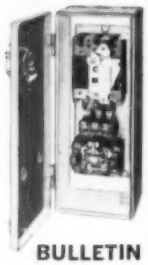
26—Hose fittings. Here's a colorful 24-pager (Form B-5) with specifications, descriptions, illustrations, and shipping weights of pressure clamps, fittings, other allied products. Gives application instructions. *Band-It Co.*

27—Solenoid valves. Folder 2111-7 (8 pages) presents large-size Electroflo valves that include field-tested design improvements using Teflon components. Tables of voltages, cycles, etc. *Hays Mfg. Co.*

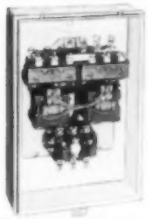
28—Steel tubing. Seamless carbon and alloy tubing (up to 7-in. OD) and electric welded tubing (to 7½-in. OD) are discussed in Catalog



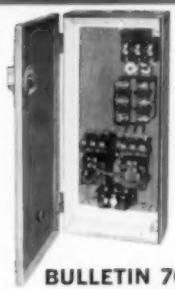
BULLETIN 712
Size 1 combination starter with fused disconnect switch



BULLETIN 713
Size 1 combination starter with circuit breaker



BULLETIN 705
Size 2 across-the-line reversing starter with overload relays



BULLETIN 706
Size 1 reversing starter with fused disconnect switch

BULLETIN 715
Size 1 across-the-line, multi-speed starter with overload relays

BULLETIN 717
Size 2 multi-speed starter with circuit breaker

BULLETIN 702
Size 3 three-pole, a-c solenoid contactor

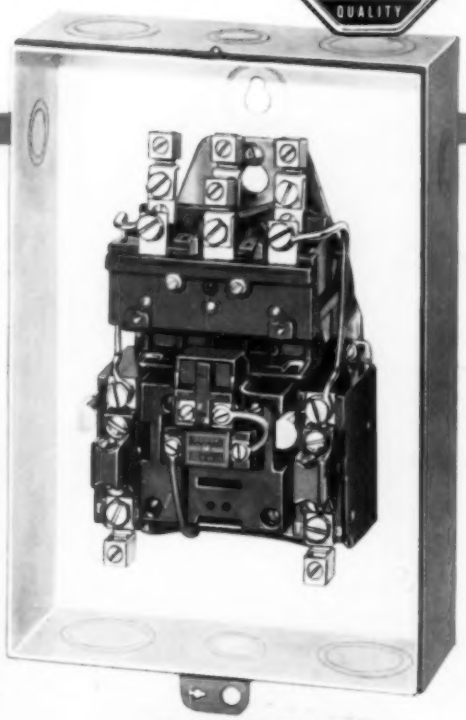
Pygmies in Size
Giants in Performance—
the NEW Allen-Bradley Across-the-Line Starters!

This new line of across-the-line motor starters is the result of over 30 years of experience and leadership in the motor control field.

While retaining the simple solenoid principle—with only ONE moving part—these starters are completely new in every way. They are amazingly small in size—yet test after test has proved they will not only outperform but also outlast any starter now on the market. They are good for *many millions* of trouble free operations. All have scores of design refinements that make them easier to install and maintain. All are available in the smart new enclosures designed by Brooks Stevens. They make a beautiful addition to any machine or control installation.

You'll want to get the complete story about these truly revolutionary new across-the-line starters. Write for new Publication 6100.

A-B QUALITY



BULLETIN 709

This popular across-the-line solenoid starter shows the new Size 2 construction. Note the white interior and generous wiring space. Bulletin 709 starters are available, in the new construction, in seven sizes—Sizes 00 to 5, with a maximum rating of 100 hp, 220 v; 200 hp, 440-550 v.

11-61-RM

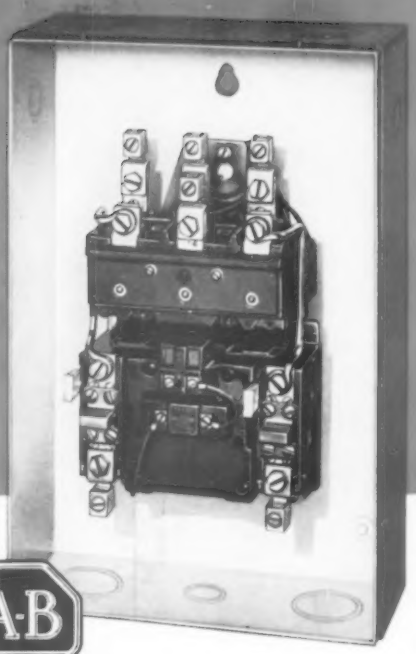
ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

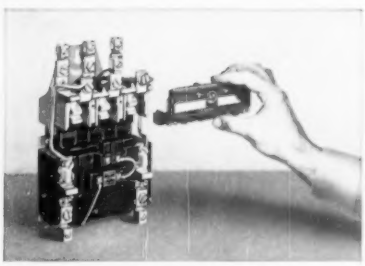
QUALITY MOTOR CONTROL

Features of the NEW Allen-Bradley starter line that are of value to you!

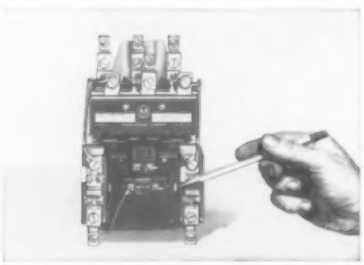


New Bulletin 709 Size 3 across-the-line motor starter. Note the generous space for wiring, accessible terminals, and white interior.

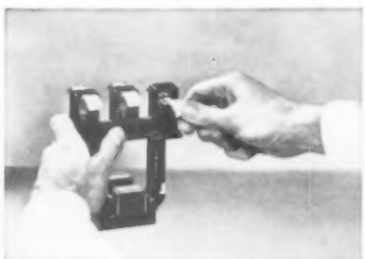
Every detail of the new Allen-Bradley motor starters has been designed to help make this the best line of motor control on the market. Remarkably small in size, each starter is a giant in performance. Being light in weight, these starters are easy to handle and a cinch to install. The generous wiring space, full front wiring, white interiors, and convenient knockouts make installation easy. The enclosure cover is firmly held with a quarter-turn fastener. All installation, inspection, and maintenance operations can be handled from the front—as shown in the illustrations below—without the use of special tools.



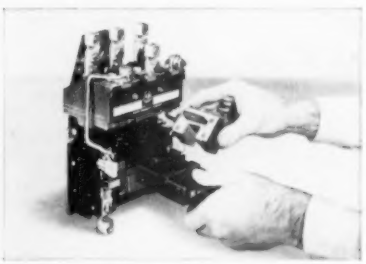
QUICK, EASY CONTACT INSPECTION—When the arc hood front cover is removed by loosening two captive screws, contacts are plainly visible from the front.



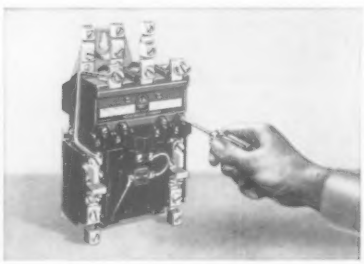
CONTACT POSITION INDICATED—Two slots in the coil cover show the position of the movable contact support—tell whether contacts are "closed" or "open."



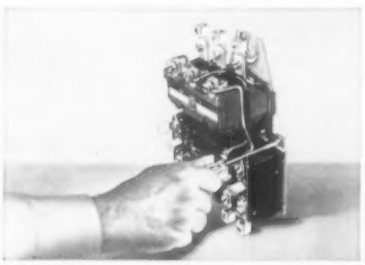
CONTACTS EASILY REPLACED—Depress the spring slightly, and the movable contacts can be lifted out of the molded support and the new contacts slipped in.



COIL EASILY CHANGED—When the coil cover is removed, coil and magnet yoke can be lifted out from the front. They are impossible to replace incorrectly.



AUXILIARY CONTACTS EASILY ADDED to the front of the starter. Two extra auxiliaries can be added to Sizes 0, 1, and 2 starters, and four, to Sizes 3, 4, and 5.



A THIRD OVERLOAD RELAY CAN BE EASILY ADDED in the field, from the front of the starter. And the only tool needed is a common screwdriver.

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

QUALITY MOTOR CONTROL

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

CS-61 (8 pages). Includes sizes, tolerances, specifications, photos. *Copperweld Steel Co.*

29—Valves. Bulletin 91043 (4 pages) explains new approach in valve design to solve wear and maintenance problems in controlling abrasive or corrosive fluids and gases. Gives specifications, optional features. *Airmatic Valve, Inc.*

30—Valves. Two methods for determining flow characteristics of maker's valves are discussed in Bulletin V-602 (20 pages). Tells how to use data from pressure drop tables and how to correct flow conditions. *Rockwell Mfg. Co.*

MECHANICAL

31—V-belt drives. Catalog Section 50-C is a 64-page engineering and specification guide. More than 400 stock sheave sizes (from single to 20-groove) are listed for A, B, C, and D section V-belts. *Fort Worth Steel & Machinery Co.*

32—Speed reducers. Data sheet (No. 600) presents latest addition to company's line of torque-arm speed reducers. It's a size 17 single-reduction unit with 5:1 gear ratio. Drawings. *Dodge Mfg. Corp.*

33—Rod ends, spherical bearings. Catalog No. 101 (12 pages) describes design and other features of these units. Technical data include load ratings, dimensions, materials, diagrams, photos. *Split Ball Bearing Div., MPB, Inc.*

ELECTRICAL

34—A-C motors. Bulletin B-2515 (16 pages) describes complete line of new a-c motors from 1 to 2000 hp. Product features are outlined for easy selection of right motor for every application. *Reliance Electric & Engineering Co.*

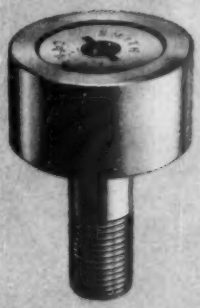
Turn the page

CRANES HOISTS
CONCO
CRANES HOISTS
CONCO
Custom-Engineered
Overhead Electric Traveling
Cranes in Capacities to
150 Tons. Write for Bulletin 5000B.
Material Handling Division
CONCO ENGINEERING WORKS, INC.
Mendota, Illinois
AFFILIATES: Spartan Tool Division—Powered Sewer Cleaning Equipment • Field Control Division—Barometric Draft Controls • Conco Building Products, Inc.—Brick, Tile, Stone
For more facts Circle 511 on Reader Service Card

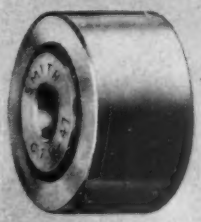
SMITH

CAM FOLLOWERS AND YOKE ROLLERS

HCS CAM FOLLOWER



CTA CAM FOLLOWER



CTY YOKE ROLLER

Precision Made For Precise Performance

Each component of Smith Cam Followers and Yoke Rollers is carefully engineered, machined and finished to the most exacting standards and dimensions. As a result, each Standard Smith Cam Followers and Yoke Roller is identical to all others of the same series and size.

Such uniformity of product results in equal uniformity of performance.

Standard Smith "CTA" (interchangeable) or "HCS" (High Capacity Stud) Cam Followers and "CTY" Yoke Rollers, assure you of outstanding performance with long, trouble-free life.

Special Smith Cam Followers and Yoke Rollers to suit special applications are supplied promptly.

Better distributors throughout the nation stock and sell Smith Cam Followers and Yoke Rollers.

Write for your new, quick reference data sheets.

SMITH BEARING DIVISION

Accurate Bushing Company

445 North Avenue, Garwood, New Jersey

Manufacturers of: Needle Bearings, Cam Followers, Yoke Rollers, Jet Engine After Burner Rollers and Bearing Assemblies, N. A. S. Standard and Special Bearings, High Temperature and Severe Wear Precision Parts.

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

35—Strip heaters. Descriptions of general-purpose and finned-type heaters are provided in 12-pager (C300). Gives temperature ratings, wattages, voltages, and dimensions. *The Bryant Electric Co.*

36—Precision switches. This 20-pager (No. 104) lists over 200 items, including miniature, special-purpose, toggle, limit, other switches, and electronic switch-circuit assemblies. Ratings, etc. *Minneapolis-Honeywell Regulator Co.*

37—Electron tubes. Here's a 32-page booklet that discusses mechanical and electrical design criteria for each major tube type. Gives applications and characteristics for triodes, tetrodes, other tubes. *The Machlett Laboratories.*

38—Insulation testers. Bulletin 21-45-16 (12 pages) presents new testers in the 500- and 1000-volt class. Come in two-voltage, hand-rectifier, and dual-operated models. *James G. Biddle Co.*

AUXILIARY

39—Centrifuges. "Centrifugal Separations for the HydroCarbon Processing Industry" is a 4-page bulletin (No. 2800) that describes and lists specifications for centrifuges, centrifugal screens, and separators. *Dorr-Oliver Inc.*

40—Air compressors. This 32-page catalog contains specifications for air seal and piston-type compressors and accessories, including portable and stationary units powered by electric motor or gasoline engine. *Johnson Service Co.*

41—Snubbers. Three bulletins give specifications and other information for a series designed for particular levels of noise suppression. Snubbers are identified as BMA-First Line, BMB-Standard, BMC-Compact. *Burgess-Manning Co.*

Turn the page

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AGAINST...
(partial list)

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SOLDERING FLUXES, FUMES, PASTE
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EVEN FULL STRENGTH HYDROCHLORIC ACID

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...PROTECTED WITH "KERODEX"®

This dramatic 60 second laboratory test proves the superior protective qualities of "KERODEX" #71. Note: In working with hydrochloric acid, standard safety precautions should always be observed.

IN-PLANT TESTING OFFER AVAILABLE. "KERODEX" Protective Barrier Cream is used in laboratories and factories of America's largest manufacturers . . . to speed hazardous processes, cut down wash-up time, save expensive soaps, cleaners and solvents. Available as "KERODEX" #71 for wet work, "KERODEX" #51 for dry work. To prove the worth of "KERODEX" in your plant, order this test offer.

ONE DOZEN 1/4 LB. TUBES OF #71 OR #51 FOR ONLY $10.80
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WRITE DEPT. F-6

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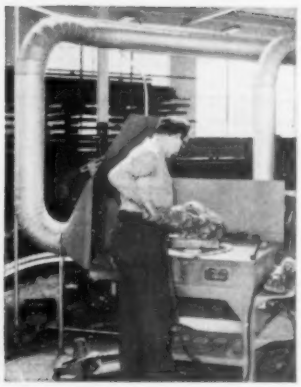
AIR IN MOTION KEEPS MEN IN MOTION

Dusty or fume-laden air can curtail production and increase maintenance costs by dulling worker efficiency and damaging bearings, motors . . . even machines.

Efficient K & B Dust Control Systems put AIR in Motion to become an important production tool.

In the plant of a noted chain and forging firm, an official made this comment about a new K & B installation: "Our workmen can now work full time . . . this means added production for them and for the company as well."

Call on K & B engineers to put *AIR in Motion* and help boost your plant efficiency. The Kirk & Blum Manufacturing Company, 3209 Forrer Street, Cincinnati 9, Ohio



K & B system serving castings grinding removes dust, sand and chips as fast as they are produced. Work revolves on turntable to enable operator to work continuously.

50 YEARS OF SERVICE

KIRK & BLUM

DUST CONTROL

K & B Down Draft Dust Control System in plant of The Monarch Machine Tool Co., Sidney, Ohio

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

42—Axial-flow fans. This 16-page bulletin (AFF-61) covers fans for heating, cooling, ventilating, fume removal, and drying systems. Construction details, specifications, photos. *L. J. Wing Mfg. Co.*

43—Oil-bath air cleaner. Bulletin 160-A (8 pages) describes low-resistance Model C Type P Cycoil air cleaner with pneumatic oil life. Operation data, maintenance procedures, filter cell service. *American Air Filter Co.*

44—Air-conditioning products. Construction, performance, other information on maker's line are contained in Bulletin GAC150.01. Covers over 300 models of air-conditioning equipment. *Hi-Press Air Conditioning of America, Inc.*

45—Refuse burner. Spiral-bound 12-page catalog points out advantages of burner. Information on multiple-feeding methods, operation, pre-fabricated construction, types of waste burned, photos. *Wilco Machine Works, Inc.*

46—Boilers. Bulletin 1275 describes and illustrates new positive-flow boiler. Special features include positive ciculation design with side-located furnace, hinged front and rear covers. Sizes, ratings. *Orr & Sembower, Inc.*

47—Indirect-fired heaters. Specifications, capacities, and other data are presented in Bulletin 800 (8 pages). Shows how Fintube maintains low metal wall temperatures in heater. *Brown Fintube Co.*

48—Accumulators. Here's a 2-page supplement to Bulletin No. 387. Contains specifications and other data for piston-type accumulators that feature self-balancing piston, triple O-ring seal, auto-relieving piston. *Hale Fire Pump Co.*

49—Blowers, gas pumps. Bulletin S-32-A (12 pages) tells how lobe-type, rotary positive displacement

this patented

CLIP and STUD

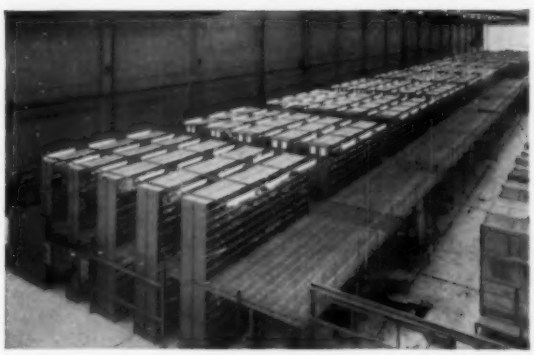
makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

- ★ Easy, fast, low cost assembly.
- ★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.
- ★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

Factories in Aurora, Ill.—York, Pa.—Los Angeles



There are many types of Lyon steel shelving. Above—a mezzanine (double decked) stockroom in which the lower installation supports the entire second floor. A big saver of valuable floor space.

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• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

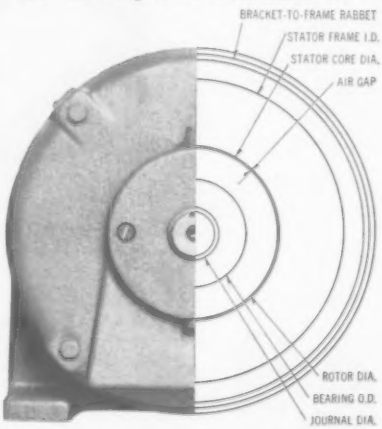
A MOTOR IS A SERIES OF CIRCLES

Checking bracket rabbet of an Elliott C-W Motor

The smooth, quiet, cool operation of Elliott Crocker-Wheeler motors is a direct result of the accuracy and concentricity of the "circles" that are its most important dimensions. Some of these circles are identified in the drawing below.

The bracket rabbet is a reference for bearing bore and shaft bore. Through matching jigs, the rabbets and bores of the stator are made accurately concentric with the bracket. Thus, when the motor is assembled, the series of concentric circles has been accurately established. With all parts in alignment, there is no preloading of bearings, air gap is uniform, noise is minimized, heat transfer expedited, smooth, trouble-free operation assured.

The highly-perfected, precision manufacturing processes by which Elliott achieves this vital concentricity are described by a booklet, *The Fine Art of Building Better Motors.* We will be happy to send you a copy. Contact nearest Elliott office, or write Crocker-Wheeler Division, Elliott Company, Jeannette, Pa.



Precise fit and concentricity of brackets to frame, frame to core, shaft to rotor and bearings, and bearings to brackets gives Elliott C-W Motors long life, trouble-free operation.

Elliott Crocker-Wheeler integral-hp a-c and d-c motors—from smallest to largest—are offered in all conventional enclosures and modifications; with insulation to suit the application, including EPA SEAL the epoxy insulation used where conditions are very severe. W1-4

ELLIOTT COMPANY

GENERAL OFFICES: JEANNETTE, PENNSYLVANIA

PLANTS AT: Jeannette and Ridgway, Pa.; Springfield, Ohio

TURBINES · GENERATORS · MOTORS · COMPRESSORS · TURBOCHARGERS · EJECTORS · STRAINERS · TUBE CLEANERS

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

blower delivers metered amount of air against varying pressures with minimum friction. Diagrams, charts, photos. *Sutorbilt Corp.*

50—Boilers. Specifications and tables of ratings and dimensions of boilers for low-pressure heating are given in Bulletin 649B (8 pages). Includes selection data for heating coils and fans. *American-Standard Industrial Div.*

PLANT SITES

51—North, South Carolina. Are you thinking of moving south? "The Piedmont Carolinas, Where Wealth Awaits You," gives details on economics, basic resources, opportunities, and the like.—*Duke Power Co.*

52—Maine. People down east have thought up a plant location "do-it-yourself" kit. It has a checklist of 10 items such as transportation, labor, etc. Several indexed booklets give facts. *Maine Dept. of Economic Development.*

53—Five-state area. Here's a 4-page folder with information on transportation, markets, local financing, living conditions, and labor reserves in small city and rural areas of Md., Ohio, Pa., Va., and West Va. *Allegheny Power System.*

BUILDING

54—Pole buildings. Bulletin W391 (4 pages) outlines bay-gable buildings that use pressure-treated poles for rigid framework. Metal, cement/asbestos panels, or other siding may be used. Widths to 110 ft., any length. *Koppers Co., Inc.*

55—Shores, clamps. This 12-pager (BR74) describes Rooshors (for faster, safer shoring) and column clamps that save material and time. Includes technical data, photos, diagrams. *Baker-Roos, Inc.*

Turn the page

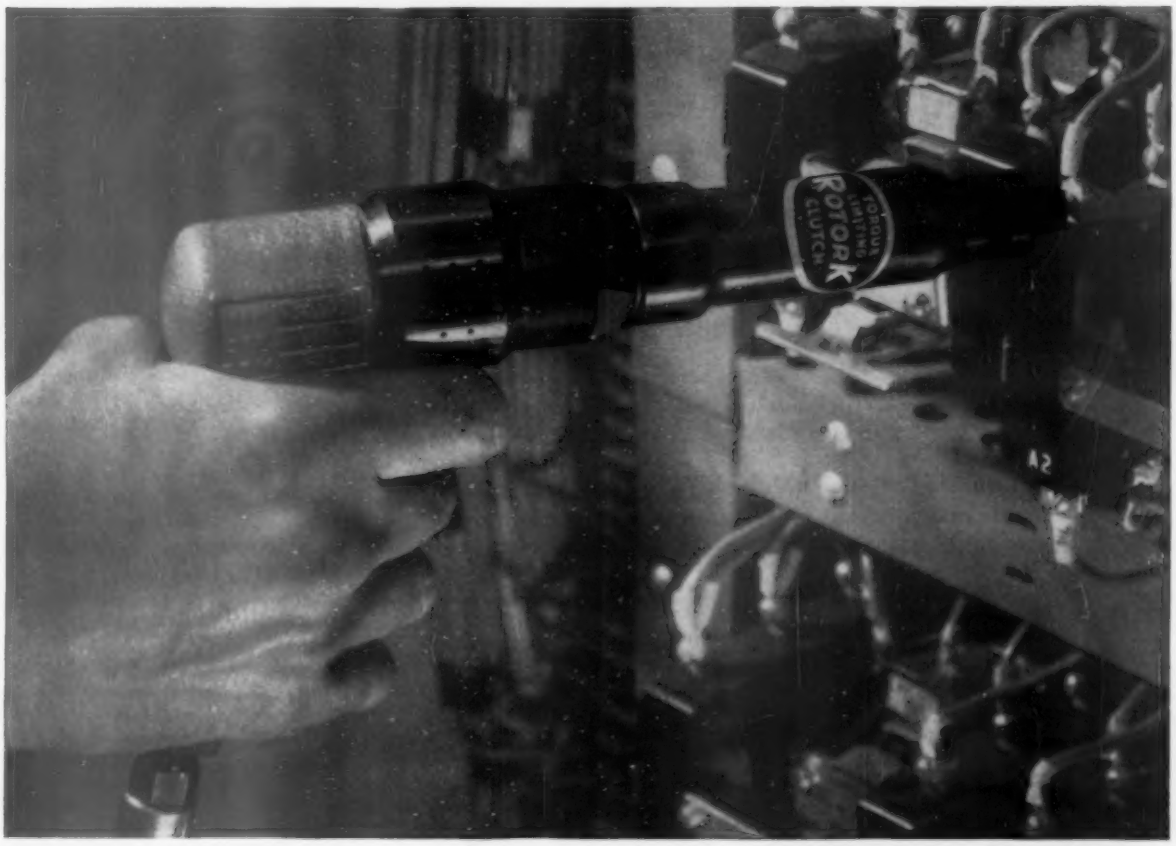
NEW! ROTORK for precision fastening ...another right tool for the job

RotorK Features

- Accurate. Kicks out at preset adjustment.
- Wide adjustment range.
- High standard of quietness.
- Famous Rotor simplicity of design.

Rotor Tool broadens further its line of assembly tools with RotorK. This new tool with torque-limiting clutch sets high standards for *accuracy* for jobs requiring controlled fastening. In addition to RotorK, Rotor Tool offers assembly tools with other types of clutches—direct, positive, adjustable (cushion) and impact types—to give you *the right tool for the job.*

Call the nearby Rotor Application Engineer for an unbiased study of your work, or write for bulletins on Rotor Assembly Tools and RotorK clutches. The Rotor Tool Company, 26300 Lakeland Blvd., Cleveland 32, Ohio.



Here's the RIGHT TOOL for YOUR job!

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ROTOR AIR TOOLS: Assembly Tools • Drills • Small Wheel Grinders
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Special Tools • Air Motors
ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

For more facts Circle 517 on Reader Service Card

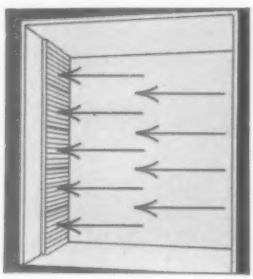
the CLOSED door that's always OPEN

"Air Curtain" in use at Merchants Refrigerating Company, Vinita Park, Mo. It separates −10°F freezer area from shipping dock.

The American Air Curtain is a "barrier" made of moving air. It lets people and products move freely...yet it keeps out cold, heat, wind, rain, or snow—completely. Smoke, dust, and insects can't penetrate it.

Use it for a loading platform entry. Use it for confining paint fumes, heat from bakery ovens or die-casting machines, or cold storage spaces.

Chances are there are a dozen good uses in your plant for an American Air Curtain. Write us for complete details.



In this case, air travels horizontally to form a barrier between rooms of different temperatures.

AMERICAN AIR CURTAIN
A DIVISION OF UNIVERSAL MATCH CORPORATION
ST. LOUIS 35, MO. • NEW YORK 18, N.Y.

Begins on page 213

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

56—Laminated glass. Physical properties and methods for installing this architectural glass are discussed in 8-pager (AIA File 26-A-5). Can be used as room dividers, partitions, doors, windows, sky-lights. *Monsanto Chemical Co.*

57—Washroom equipment. "New Directions in Contemporary Washroom Design" is a 4-page bulletin (A1418) that describes washfountains and group shower equipment. Photos. *Bradley Washfountain Co.*

INSTRUMENTS AND CONTROLS

58—Humidity measurement. Here's a comprehensive catalog (No. 661) that lists 12 typical and specially tailored hygrometer systems adaptable to most humidity measurement-control problems. Instrumentation data. *Hygrodynamics, Inc.*

59—Load controls. "Cutting Production Costs with an MEK Load Control" presents device that continuously analyzes use of electric power by a machine or process. *Machinery Electrification, Inc.*

60—Automation system. Bulletin G-2500 (16 pages) explains how drive speeds of machines and processes can be automatically controlled by simple pneumatic instrumentation. Diagrams. *Reliance Electric & Engineering Co.*

61—Control centers. This 8-pager (F-8031-1), "Electronic Control Centers," discusses specific functions and components. Describes remote temperature indication, recording, etc. *Barber-Colman Co.*

62—Closed circuit TV. Engineering analysis, features of systems, installation and operation details are contained in one 4-page and five 2-page application bulletins. Diagrams and photos. *International Telephone & Telegraph Corp.*

Bitumastic® No. 50 protects tank for corrosive, swamp-land service

The problem of protection for metal tanks in soils with high moisture content has long been a matter of concern to corrosion specialists: the protective coatings chosen must provide years of maintenance-free service and absolute resistance to corrosive attack by sub-soil moisture. Inspection and repair of buried tanks can be prohibitively expensive.

That's why five petroleum storage tanks, identical to that pictured above, were recently installed at a service station in Secaucus, New Jersey, after a costly failure of older tanks. Bitumastic No. 50 was chosen for heavy-duty protection of these tanks from sub-soil moisture in the loamy Jersey Meadow.

The surface of each tank unit was thoroughly cleaned, and then given a permanent covering of Bitumastic No. 50, the Koppers coating with tough, thick, water-resistant qualities for heavy-duty service.

The unique protective qualities of Koppers coal-tar coatings serve corrosion experts in almost every industrial and marine application. Bitumastic coatings have become synonymous with the finest form of corrosion protection available today. For information on the Bitumastic coating suited to your needs, send the coupon or write: Koppers Company, Inc., Pittsburgh 19, Penna. District Offices: Chicago, Los Angeles, Pittsburgh, New York and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario.

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Gentlemen:
Please send me more information on the Bitumastic family of protective coatings.

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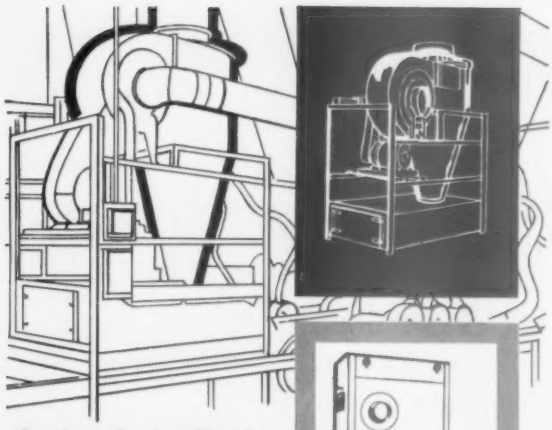

Custom dust collection
—with a standard unit . . .

Regardless of your dust collection problem, chances are there is a space-saving Dustkop model to fit the job. Aget, for years, has led the field in efficient, compact design and has developed more than 50 standard Dustkop collectors. Each is job-tailored to most grinding, buffing or finishing operations—as well as many other types of service. Write for illustrated brochure that helps select your tailored Dustkop unit.

Also a complete line of mist collectors

C.S.A. APPROVED. Write for name of nearest representative in Canada

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DUSTKOP Stops Dust

For more facts Circle 520 on Reader Service Card

PRESTIGE PRODUCTS Since 1906

BENNETT WASTE RECEPTACLES

for every requirement

SANI-CAN

Bennett, makers of the most complete line of waste receptacles in America, now offer, in addition, famous Sani-Can step-on receivers. Whatever your requirements for waste receptacles, you'll find the specific models you need in the Bennett catalogs.

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MANUFACTURING CO., INC.
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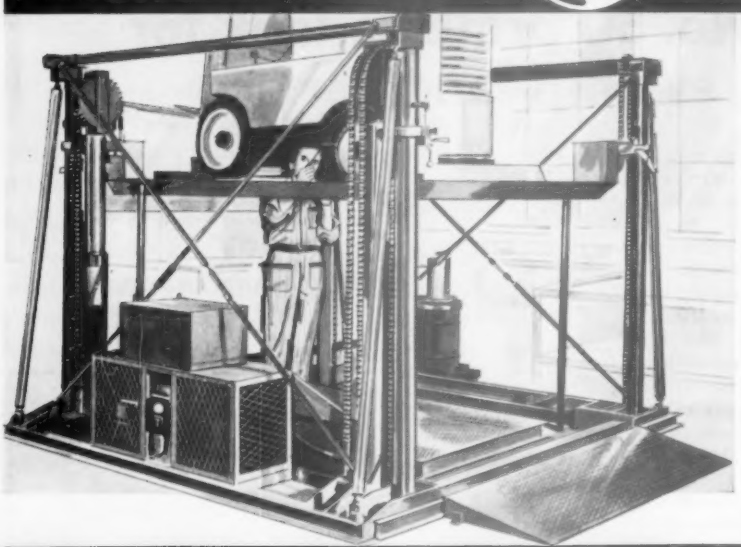
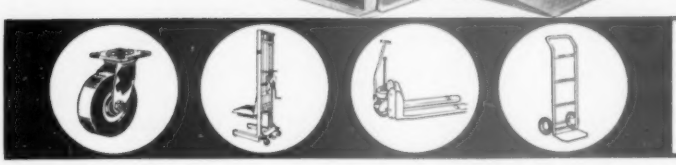
from the ground UP Colson builds it better...



Colson maintenance machinery and equipment is designed to make each specific job quicker, safer, easier. Colson products actually prove, by outperforming and outlasting all others, that quality costs less when you buy the best!

No pit or sub-surface installation necessary with a Colson Lubrilift! Maintenance crews get under and inside to speed up greasing entire fleets of 3 and 6 ton fork lifts, as well as other trucks and tractors, with minimum labor and maximum efficiency, economy and safety.

Send today for FREE catalog illustrating Colson stationary and portable industrial platform and maintenance lifts! Capacities from 2,000 to 20,000 lbs.



THE COLSON CORPORATION
7 South Dearborn Street • Chicago, Illinois
Plants: Jonesboro, Arkansas; Elyria, Ohio; Somerville, Massachusetts; Toronto, Can.

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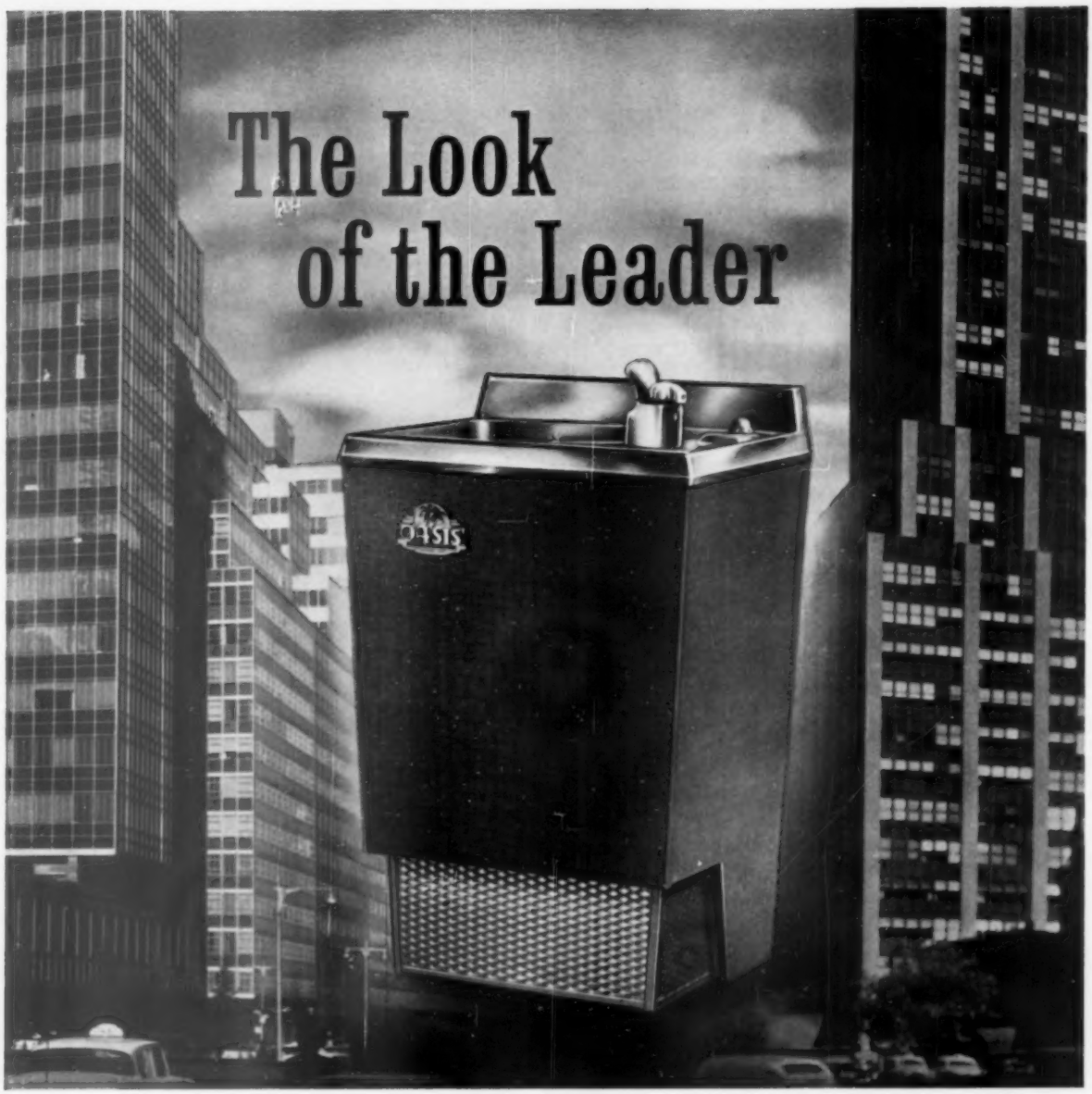

Performs as well as it looks, too. Quietly, dependably. Endures the rigors of everyday use and abuse year after year. Carries the best warranty in the industry: a full 5 years on all parts. Super efficient Pre-Cooler nearly doubles cold water capacity at no extra cost. Stainless steel top can't rust, tarnish, chip, or crack. Oasis Water Coolers serve more offices and shops than any other kind. Available in pressure or bottle-types . . . Standard or Hot 'n Cold. Write for free, illustrated booklet.

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BY THE EBCO MANUFACTURING COMPANY

rented or sold everywhere

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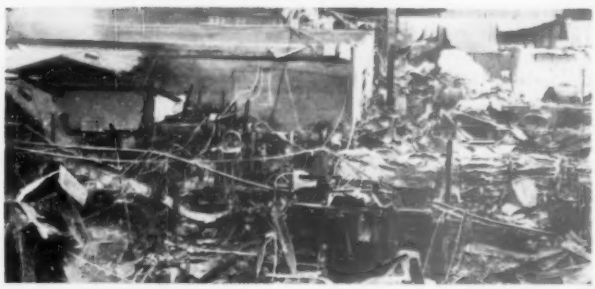
For more facts Circle 523 on Reader Service Card

INDUSTRIAL CIVIL DEFENSE

Is it helpful or hopeless?

Called a national disgrace and a political football, Civil Defense is besieged by apathy. The truth is, it can help your plant—and even save your life. Here's how.



FIRE AND DESTRUCTION (above) was not caused by the nuclear explosion at right. But good CD can protect your plant against any disaster.

At press time, President Kennedy announced a new CD plan (details on page 80).

To most Americans the thought of a nuclear cloud is an excursion into hopelessness.

To an American plant man, a vision of that same cloud should excite him into actions that can save lives *and* money in his plant. A candid, realistic approach to industrial civil defense can result in the least expensive, most effective *general* disaster-control program.

Civil defense or disaster control (we'll use the two interchangeably) is like any kind of insurance. If you've never experienced a devastating fire or explosion, you see little need for costly equipment and procedures to control such disasters. Your apathy mushrooms when a nuclear attack is used as the reason for the program.

Except in New Jersey, the law *does not* require you to have a CD program in order to operate. For this reason, the CD coordinator of a small middle Atlantic states manufacturer calls the federal program a national disgrace. He says that, with the exception of certain military contractors, most plants do what they want and that usually means nothing at all.

Some experts suggest we follow the example of other countries. In Sweden, Denmark, Norway, and Switzerland, citizens are liable for compulsory civil defense service. Sweden is noted for its underground factories.

According to one expert, Stanley J. Tracy of George Washington University, an extensive compulsory program is underway in the Soviet Union to train the entire population in the fundamentals of civil defense. For years Russia has been practicing dispersal of factories as protection from nuclear attack.

In American industry the petrochemical people have long practiced strict disaster control. The highly volatile nature of their processes demands it. But metalworking plants, too, can be destroyed by disaster. A notable case was the 1953 series of explosions and fire that gutted General Motors' "fireproof" Livonia, Mich., transmission plant.

How would you handle such a holocaust if it struck your plant or the plants around yours?

If you were properly prepared, you'd react the same way as in a nuclear attack and use much of the same equipment, too.

Under New Jersey's program, here's what you need to be considered prepared for disaster:

- A disaster control coordinator.
- Well-trained DC survival corps.
- A fully equipped communications center.
- Close, integrated cooperation with the local municipal CD-DC organization.
- Membership in a mutual aid council.
- A plan for evacuation of personnel.
- Readily available rescue and salvage gear.
- Protection for vital records and documents.
- A written plan, familiar to all personnel, explaining DC procedures and organization.
- Regular participation in state, local, or mutual aid test exercises.

What does all this cost? It depends largely on how much disaster equipment you already have on hand, and on the size of your plant. It can cost you anywhere from a few dollars to several thousands. In any event, the money you spend on CD-DC equipment for your plant is tax-deductible.

According to the Internal Revenue Service, the following are considered non-capital expenses deductible in the year expended: CD training for employees, including instructors; fire-fighting equipment; participation in CD test drills; attendance at CD meetings, including transportation, lodging, meals, and the like; and minor shelter construction.

Any major construction of shelters that could be used for other plant functions, such as storage, is considered a capital expense. The same rule applies to reinforcing existing buildings to resist blast or radiation.

In most cases the argument that insurance costs go up with each CD volunteer in your plant is unfounded. In many states CD activities within the plant are covered under Workmen's Compensation. In New Jersey, any registered volunteer injured or killed while performing CD duties is covered by a state insurance plan. A check with your state CD headquarters will settle the issue for your plant.

For the last decade Industrial Mutual Aid has become the popular way to get the most for your money in disaster control. In fact, most CD authorities confess it's probably the only way to sell CD to plant management in all but the largest plants.

The efforts of the Union, N. J., mutual aid group is a recent case in point.

Mutual aid in New Jersey usually starts at the county level. In Union County it began about five years ago with the now well-known Linden Industrial Mutual Aid Council (LIMAC). Working through municipal police communications, this group consists largely of big petrochemical companies. But it also includes General Motors' sprawling B-O-P assembly plant. LIMAC survived the ultimate test when, in 1956, it successfully quelled a devastating gasoline fire that threatened to rout every plant in the area.

After LIMAC, county CD-DC people tried to organize industrial MACs in Plainfield and Clark townships. Both failed because of lack of interest among smaller plants.

Turn the page

By LAWRENCE F. MIHLON, Associate Editor, FACTORY

the man who buys the best today has no regrets tomorrow!

BORROUGHS STEEL SHELVING

The most simple, most flexible, most rapidly assembled shelving on the market today . . . that's Borroughs . . . and that's the shelving you should have if you want solid satisfaction for years to come. When you can assemble entire units without special tools . . . when you can rearrange shelves without nuts or bolts . . . when you can move entire units without disturbing others . . . then you've got solid value in steel shelving. Borroughs is America's number one shelving buy today — a great investment for the future that will pay off handsomely in service, efficiency and economy.

this feature alone should swing you to Borroughs

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Insert 4 shelf support brackets . . no fumbling with studs, bolts, nuts or lock washers.
Tilt shelf into support brackets . . . and shelf is ready for loading.
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OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp® KALAMAZOO, MICHIGAN

INDUSTRIAL CIVIL DEFENSE

Begins on page 230

In July 1960, mutual aid was introduced to the industrially concentrated Union Township area. Of 122 manufacturing industries, 67 agreed to try mutual aid.

The area was cut into four parts. An industrial coordinator volunteered from each part to work with the township CD man. One quarter at a time was organized during a period of about a year.

Former County Coordinator Col. H. L. Hodgskin reports company personnel managers asked two key questions: How do you sell CD to management? How much equipment do you need?

Aside from appealing to the sensibilities of management, Hodgskin reminded companies of the New Jersey law that requires any plant over 50 employees to have a CD program. He also pointed out that with a mutual aid plan, smaller plants with little to spend would benefit most. Reason: Larger plants generally have more disaster equipment on hand.

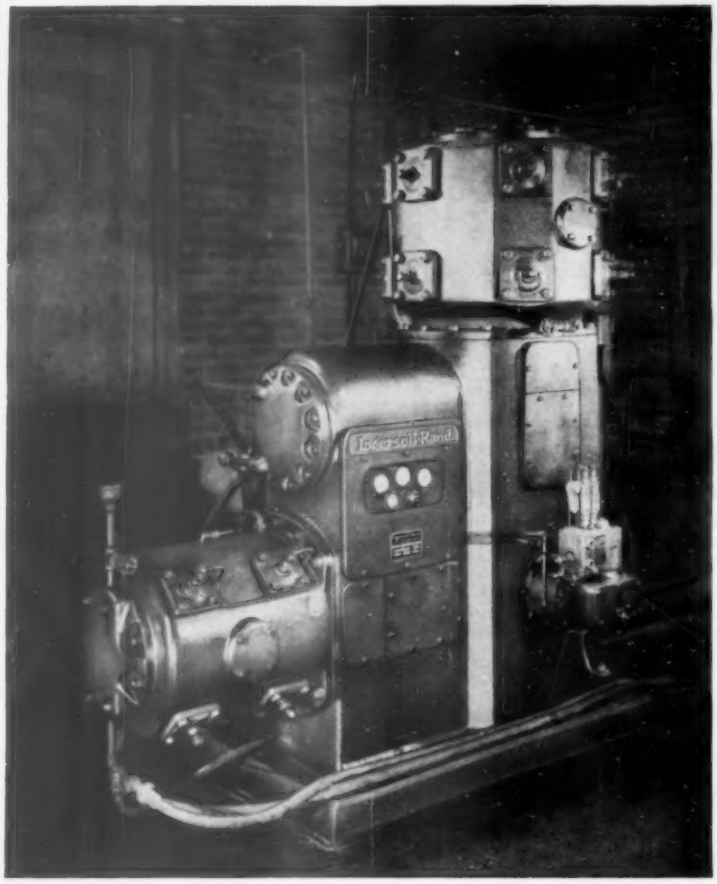
The greatest expense to any member, Hodgskin cautioned, would be for communications equipment. Basic fire, salvage, and rescue equipment is less costly. Much of this would probably already be on hand.

To further encourage members in the future, the Union County manipulators plan (1) a machine exchange in which plants hit by major machine failure can borrow replacement units from better-heeled neighbors; (2) a personnel bank, in which companies hard-hit by injury or sickness can borrow personnel to keep the plant going.

A good CD-DC plan takes people —even more than are usually needed for a good internal plant safety program. In some cases you'll have trouble getting volunteers. If production operations don't allow it, they'll have to be trained after hours on their own time. CD work can be dangerous, arduous, thankless, and unglamorous. Only intelligent communications and management recognition can encourage volunteers to participate in your program.

Since this country, according to critics, is sorely lacking in industrial dispersal regulations, very few plants

For more facts Circle 524 on Reader Service Card



IN I-R COMPRESSORS,
TIME TELLS
THE DIFFERENCE

This XLE compressor has operated 24 hours a day for more than

63,648 HOURS

with no forced maintenance since installed in 1951

At the Conshohocken (Pa.) plant of the Lee Rubber & Tire Corporation, this Ingersoll-Rand XLE air compressor has operated at full load, 24 hours a day, six days a week, with no forced shutdowns since installed in 1951. At this writing, the unit has totalled 63,648 hours and is still going strong!

The only maintenance has been to check the valves once every three months on Sunday. This XLE operates as the plant's base-load air compressor, with the load variations being handled by another unit.

The XLE compressor had been purchased largely because of good performance of other I-R equipment in the same plant, including three different types of compressors and a variety of pumps.

The *extra value* that's built into every Ingersoll-Rand compressor pays off with *long-run economy*. Reduced maintenance and attention, over many years, mean long-range savings in the cost of air power. Ask your I-R representative to show you how to get your maximum *"Dividend on Payroll Dollars"* with a Planned Annual Review of your air power system.

*ONLY IR COMPRESSORS HAVE CHANNEL VALVES

Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact.

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THE WORLD'S MOST COMPREHENSIVE COMPRESSOR EXPERIENCE

Lifting Made Easy

HOISTS AVAILABLE FOR EVERY LIFTING JOB

1✓ ELECTRIC HOISTS for frequent lifting with pace setting speed

2✓ AIR HOISTS to lift fast where atmosphere conditions are hazardous, corrosive, extremely hot, dirty or wet

3✓ CHAIN BLOCKS for easy lifting where the work cycle is moderate

P:B Budgit Electric Hoists

Series "700" Load Lifter Electric Hoist

ELECTRIC HOISTS

P:B Budgit® Electric Hoists. 1/8 to 2 tons. Modern push-button hoists for regular service. Portable. Two fully enclosed automatic brakes. Spotting action is fast, accurate. 1/2-ton load can be lifted at 34 FPM. Hook suspension. Trolleys available. Standard models for intermittent service — AC, DC, and 12-volt battery types — have pull cord control.

Load Lifter® Electric Hoists. 1/2 to 15 tons. For heavy-duty and production line service. Safe 24-volts at the push button. Single and 2-speed control. A ton can be lifted at 60 FPM. Two automatic brakes. Types for lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model increases length of lift.

Budgit Air Hoist

Load Lifter Air Hoist

AIR HOISTS

Budgit® Air Hoists. 1/4, 1/2 and 1 ton. Compact, lightweight hoists for regular lifting service. Link and roller chain types. Explosion proof motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pull cord control. Safety hooks standard. Rigid mount type and push trolley available.

Load Lifter® Air Hoists. 1 to 15 tons. Wire rope type for heavy-duty service. Five cylinder motor for smooth operation at all speeds. Speed infinitely variable to 37 FPM. Pull cord control standard; throttle control available. Mechanical load brake adjusts itself. Lug, push trolley, and hand-geared trolley suspension.

Tugit

Budgit Aluminum Chain Block

Budgit Army Type Chain Block

CHAIN BLOCKS

Tugit® . . . the Lever-Operated Hoist. 3/4 to 3 tons. Light. Compact. Portable. Operates easily at any angle even in close quarters. Has countless uses in every industry. Spur-geared for highest efficiency. A 42-lb. pull on the handle lifts 2 tons. Spark and corrosion resistant models.

Budgit® Chain Blocks. 1/4 to 10 tons. For production or maintenance. Combine light, strong aluminum frame with spur-geared lifting and automatic load brake. 25 lb. pull on hand chain lifts 1/4 ton. Hook suspension standard. Trolleys available. Army-type Budgit has integral trolley that can be adjusted to fit several sizes of I-beams and permits high hook lift. Ask about spark and corrosion resistant models.

SOLVE YOUR LIFTING PROBLEMS. Call your nearby Shaw-Box Distributor for practical help in selecting the best type of overhead load handling equipment — hoist or crane — for each task. Or, write us for literature.

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Begins on page 230

are totally immune to nuclear attack. Generally speaking, if your plant is within 30 miles of a population center of 150,000 or a major military installation, it's vulnerable. If you're in a highly industrialized area, where there is great variety of industry, you're vulnerable to just about any kind of industrial disaster, including nuclear attack.

If you have a government contract for a vital product, you're probably liable to some CD-DC plan. That is, if the military observer for your plant hasn't already "suggested" certain measures.

How do you get started? Contact your local CD office, the state CD group where your plant is located, or the Office of Civil and Defense Mobilization, Washington 25, D. C. The plant below did this, and got itself a practical CD-DC organization.

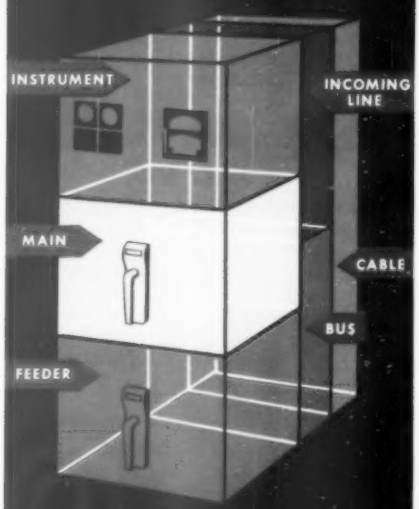
Three years ago, a ruptured fuel line vividly proved the value of CD-DC to managers at the Wright Aeronautical Division of Curtiss Wright Corporation (Woodridge, N. J.). Running underground and parallel to one of the plant's main steam tunnels, the leaking high octane pipe went unnoticed for days. First the fuel seeped into the ground around the tunnel; then into the tunnel itself. The spark from a faulty pump motor finally ignited the deadly fumes. Two maintenance men repairing the pump barely escaped the raging inferno. The time was 10:30 a.m. In minutes the fire was out of control. The flames could have gutted the entire plant. But with its well-organized DC group on the scene, Wright Aero did subdue the fire. In all, 30 plant volunteers fought the blaze. Quiet came at 5 p.m. the same day.

The Wright CD-DC plan that stopped the fire began in 1952, largely out of pressures of the Korean conflict. A special general manager's committee designed the program and made assignments of responsibility. The industrial relations manager was named Plant Defense Coordinator. Under him are full-time managers of: the control center; rescue and salvage (the plant engineering manager); wardens, personnel safety, medical (the plant safety manager); security guard and fire forces (the chief plant security officer). **END**

SWITCHGEAR
AS NEW INSIDE
AS IT IS OUT

INTRODUCING . . .

New Powermaster Type AKD-5 Low Voltage Switchgear



Phantom view illustrates significant advances in compartmentation achieved in Powermaster Switchgear.

Highlighted by a new concept in appearance design, General Electric's new Powermaster Type AKD-5 Switchgear reflects the needs of today's modern power systems for increased safety, added convenience and . . .

GREATER RELIABILITY

For the highest degree of service continuity, compartmentation and isolation of the key functional components in the equipment:

Minimize fault hazard—separate bus compartment prevents the entry of foreign objects such as tools, rodents, fish tapes, etc.—the major cause of bus faults.

Minimize fault communication—isolated incoming line compartment reduces hazard of fault transfer from the main bus to incoming line—thus permitting more effective operation of the main breaker on any possible bus fault.

Reduce maintenance requirements—Welded bus provides positive joints with a high degree of electrical conductivity—minimizes periodic tightening of bus bolts. New bus configuration and enclosure reduces dust contamination—minimizes cleaning requirements.

Call your General Electric sales engineer or send for publication GED-1269. *General Electric Co., Schenectady, N. Y.*

531-04

1000 KVA Load Center Unit Substation with Powermaster Type AKD-5 Switchgear. Colorful blue panels accent over-all appearance design.

GENERAL ELECTRIC

put your storage-rack dollars where they count most!

CONCENTRATE

on *American*

adjustable STORAGE RACKS

the engineered racks that fill the bill most efficiently!

American Slide-n-Lock selective type racks

for all types of merchandise—whether light packages or heavy metal products.

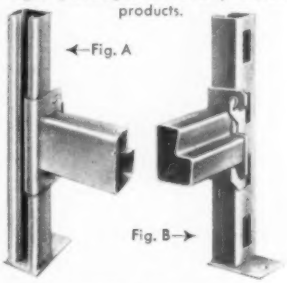


Fig. A—smooth line construction of aisle side of post and stringer eliminates hazardous protrusions. Fig. B—note rigid connection when stringer is "locked" to post.

American Open-End drive-in type racks

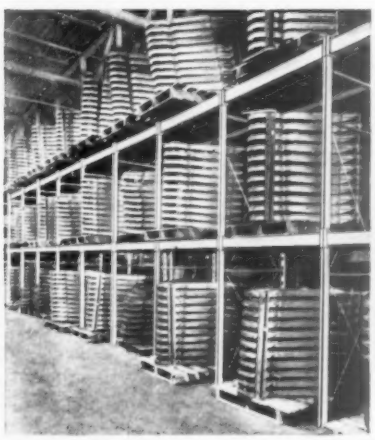
make aisle space storage space . . . ideal for bulk storage

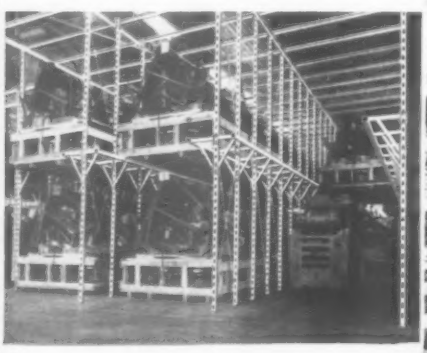
Sturdy, load-carrying Stringers are made of rugged square tubing from one end of a row to the other.

YOU can always count on American Adjustable Storage Racks for

Quick Assembly . . . Solid Construction
Easy Adjustability . . . Top Efficiency

These features save you time, labor, storage space and money, and provide industry's highest safety factor. American Posts are specially roll-formed of heavy gage steel . . . Stringers are one-piece continuous welded steel tubing—they work independently of any other part, and raise and lower like a window on 4" centers . . . Upright Frames are cross-braced against sway—turnbuckles "level out" uneven floors. In American Racks there is no costly bolting.





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5965 Linsdale Ave. amp® Detroit 4, Michigan

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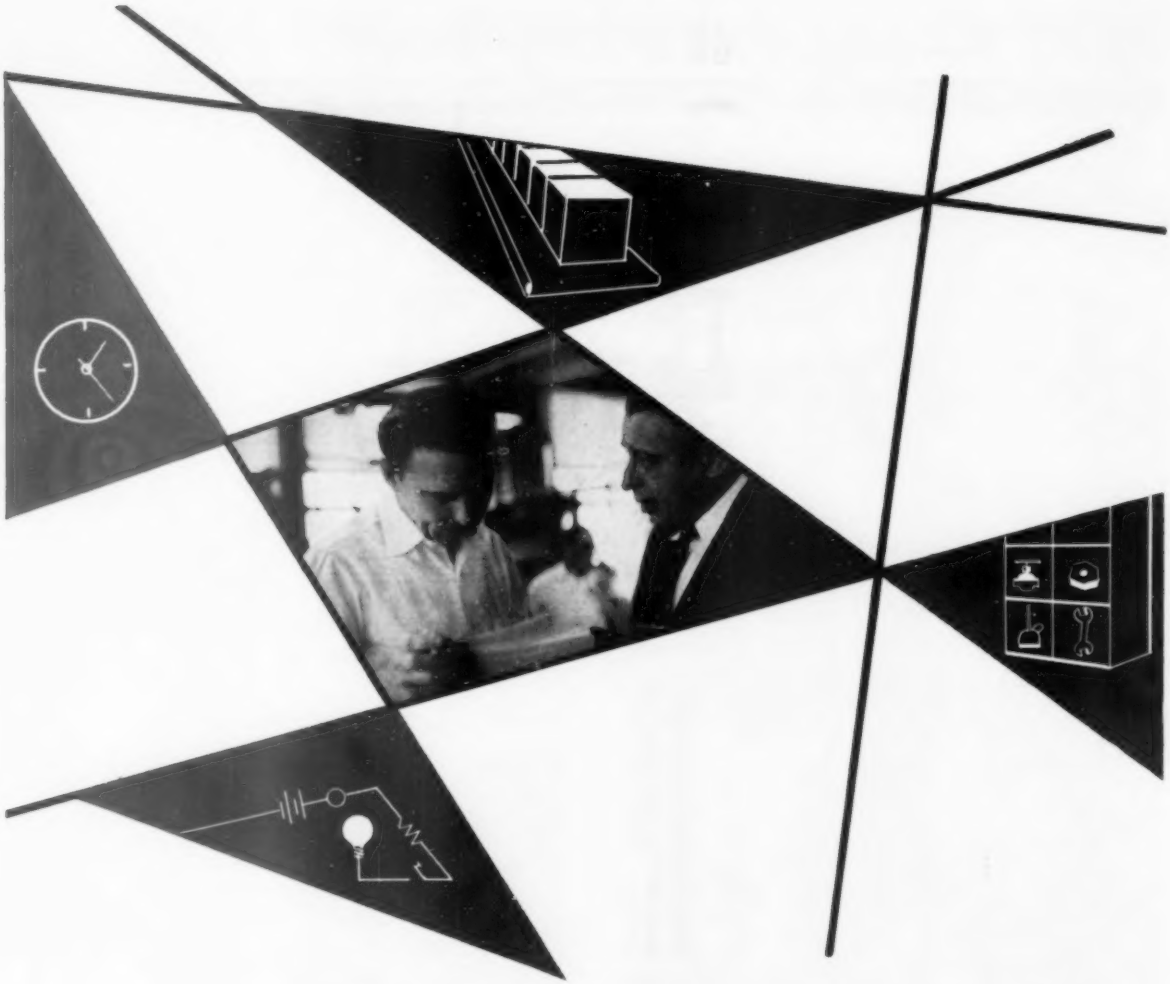

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KEYSORT® DATA PROCESSING

For the up-to-the-minute reports you need in the establishment of profitable plant management—reports in such vital areas as labor costing, operation costing, production and inventory control, application of burden rates—Keysort is the data processing system to use.

Designed for economical plant control

The reasons are many. No restrictive procedures; minimum training; remarkable economy; simplicity of installation and operation.

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Easy to use in factory and office

With Keysort you use punched cards—mechanically created for fast, easy sorting. Figures are automatically tabulated and results summarized direct to reports.

Result: Keysort automates your data processing to give you the meaningful on-time information you need for complete control of your plant and your profits. Monthly, weekly, daily. And at truly low cost.

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Your nearby Royal McBee Data Processing Systems Representative has had a wealth of experience in solving plant control problems. Working with your plant managers and foremen, with your systems and procedures experts, he can offer helpful advice about a low-cost Keysort system tailored to your individual requirements. Call him, or write us at Port Chester, N. Y.—indicating the applications in which you are interested—and we will be happy to supply you with actual case histories from our files.

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NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

For more facts Circle 529 on Reader Service Card

MATERIALS NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

Look what the right taper does for stacking

The virtues of the old-fashioned dairy pail show up in this new look in tapered pails for packaging paint, chemical, petroleum, or related products.

One man can carry or roll a half-dozen or more of these steel containers across the floor without doing a juggling act. The bottom double seams don't touch the linings of the pails below. The top curl contacts only the lower swedge so pails can't stick together when nested.

Here are a few other advantages of these pails: They meet all required ICC specifications. Open end is standard pail size so you can use your existing cover closing equipment. And each cover is embossed so pails will nest snugly after filling. *United States Steel Corp.* (Circle 195)

196—Rust preventive that's low in cost and water-compatible has many advantages for protecting indoor metal surfaces. Magnafilm 230 is transparent, can be applied over cutting oil emulsions. Costs about 1¢ per 100 sq. ft. *Magnus Chemical Co.*

197—Stainless clad aluminum offers wide industrial usage where corrosion resistance of stainless steel, plus weight, workability, and conductivity of aluminum are needed. Available in a wide range of sheet sizes and gauges. *Cerro Corp.*

198—Metallic zinc paint simulates galvanizing, yet is applied like ordinary paint. Coating is 95% zinc and resists salt spray and corrosive fumes. Covers 1200 sq. ft. of bare metal per gal. Withstands 400 F. temperatures. *The Wilbur and Williams Co., Inc.*

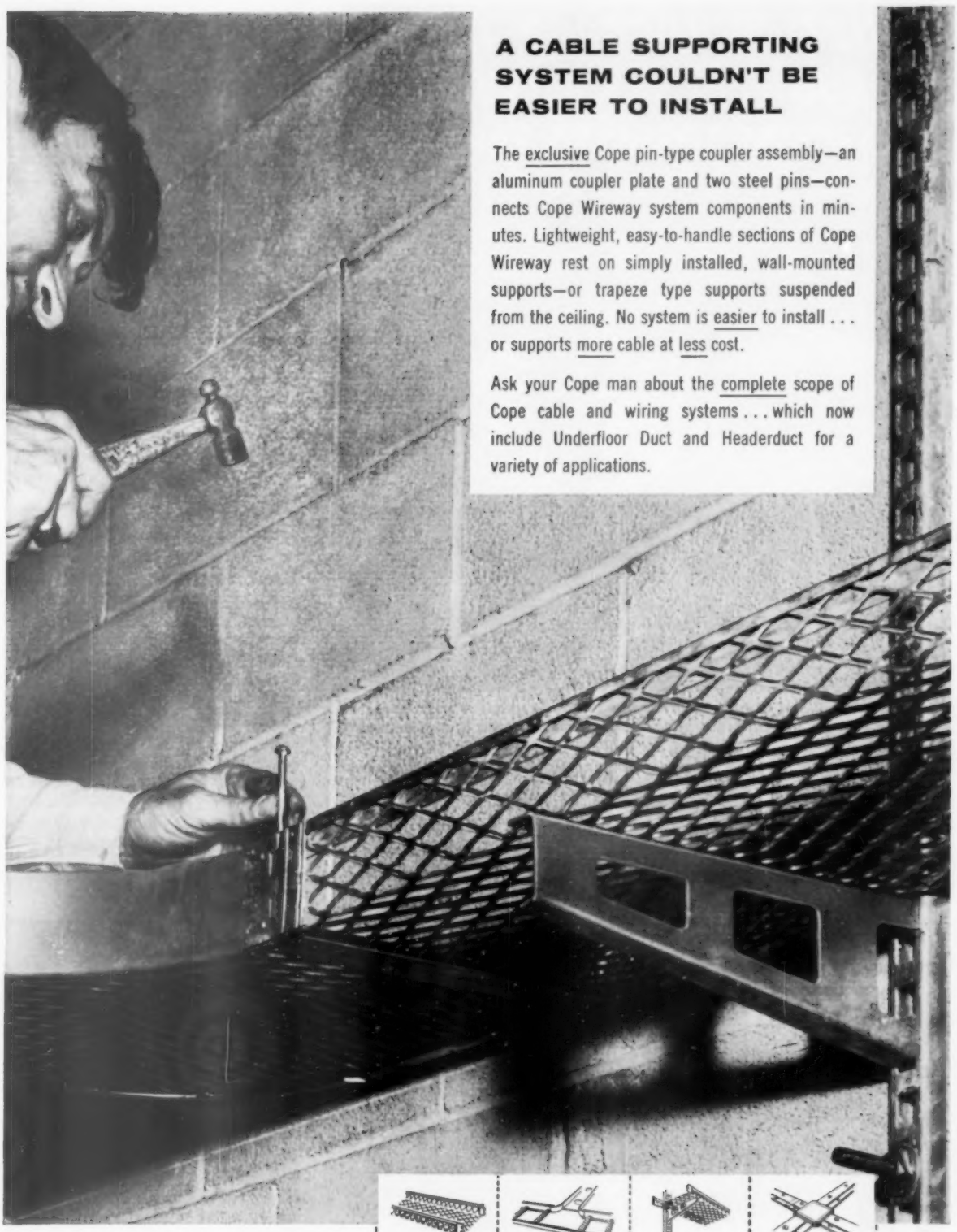
Glass fiber for fast roofing

Here's a new, extremely strong, lightweight, rot-proof roll roofing that will not blister, wrinkle, or curl. Using silicone coating, unskilled personnel can restore old roofs easily. Weight is 8 lb. per 100 sq. ft. *The Monroe Co., Inc.* (Circle 199)

Tenacious silicone bond

A new family of self-bonding compounds makes it possible to mold silicone rubber-to-steel joints that are stronger than the rubber itself. Specimens show 1500-psi. tensile, 200-psi. tear strength. No priming is necessary. About $5.20 per lb. in quantities. *General Electric Co.* (Circle 200)

Turn the page



A CABLE SUPPORTING SYSTEM COULDN'T BE EASIER TO INSTALL

The exclusive Cope pin-type coupler assembly—an aluminum coupler plate and two steel pins—connects Cope Wireway system components in minutes. Lightweight, easy-to-handle sections of Cope Wireway rest on simply installed, wall-mounted supports—or trapeze type supports suspended from the ceiling. No system is easier to install . . . or supports more cable at less cost.

Ask your Cope man about the complete scope of Cope cable and wiring systems . . . which now include Underfloor Duct and Headerduct for a variety of applications.

THE COPE DIVISION ROME CABLE CORPORATION / Collegeville, Pa.
Dept. A

ORIGINATORS OF FIRST INTEGRATED LINE OF CABLE SUPPORTING SYSTEMS

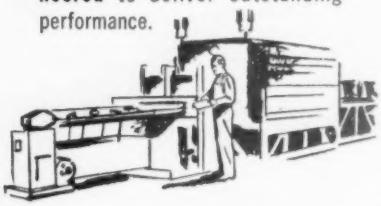
For more facts Circle 530 on Reader Service Card

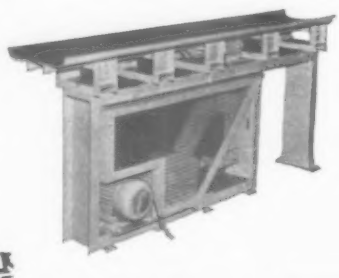
WHIZZING LUGGAGE ALONG AT 300 FEET PER MINUTE . . .
OR INCHING FORGINGS FORWARD AT 300 FEET PER HOUR . . .

Unique traveling diverter delivers luggage to claiming counter at the end of the incoming conveyer lines at United Air Lines' bright new terminal at New York's Idlewild International Airport.

IT'S ALL IN A DAY'S WORK FOR MATHEWS ENGINEERS

Whether it's a high-speed belt conveyer system smoothly handling the luggage of modern air travelers, or a **LIVE-FLO** oscillating conveyer upon which small parts are quietly but surely creeping along, you can be sure that it's **Mathews engineered** to deliver outstanding performance.





A new concept in oscillating conveyers—LIVE-FLO—is without equal where slow speed and complete control are important

MATHEWS CONVEYER COMPANY

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MATHEWS

Over Fifty Years of Leadership in Mechanized Handling

Begins on page 238

MATERIALS NEWS

For more data, circle item numbers you want on Reader Service Card.

201—Self-locking screws with nylon pellet thread insert will not loosen under vibration, yet can be removed, adjusted, or re-used. Bristol-Nylock socket screws are available in complete range of sizes in multiple spline or hex socket drives. *The Bristol Co.*

202—Urethane insulation for buildings and vessels in rigid foam sheets has "K" value of 0.15. Can be cut with ordinary tools, weighs 2 lb. per cu. ft., won't absorb moisture or rot, comes with fireproof coating. *Allied Chemical Corp.*

203—Self-protected markers for wires come pre-coded, ready to strip from protective backing. Last part of each numbered or coded strip is self-laminating extension strip of clear adhesive vinyl which protects code from dirt, oil, chemicals, etc. *Westline Products.*

204—Calking compound stays white and water-tight with stone, porcelain, or cement surfaces. Thiocaulk remains a rubber-like solid from 65 to 250 F. Apply with knife, trowel, or gun; or pour in place for gaskets or electrical seals. Colors available. *Steelcote Mfg. Co.*

205—Anti-static fluid puts an end to the static electricity that builds up on instrument windows, deflects pointers, causes faulty readings, and attracts dust. Clear Statnul works even in driest areas and on plastic surfaces. Polishes and cleans, too. *Daystrom, Inc.*

Turn the page

TEAR OUT THE COUPON

...and mail it to us!

BROWN COMPANY

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*Name*_____

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F-6

Why? What will you get? A towel — a TWS Nibroc towel — that dissolves in water — ending plumbing problems due to accidental disposal of paper towels. And we will send you a FREE sample of TWS Nibroc so you can prove it yourself!

We've left plenty of room for your name and address, so make it out now. When you get your FREE sample, test it. Put a TWS Nibroc towel in water with a regular paper towel (even another type of Nibroc towel — we make a complete line) stir them both — the TWS *dissolves!* That's *Timed Wet Strength* — TWS for short — and for you, if you want to end your plumbing problems *due to accidental disposal* of paper towels.

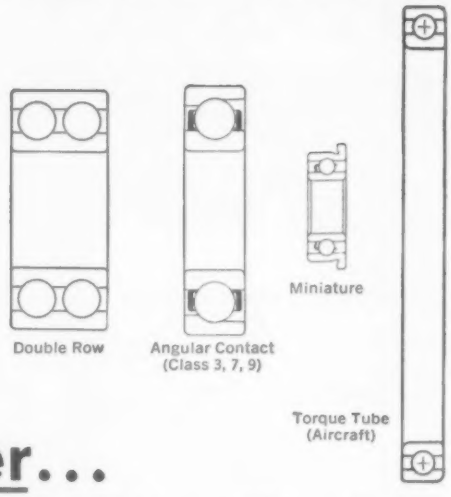
The TWS Nibroc is not as soft as other towels due to its special qualities. TWS is a special towel, for this job and this job only.

Send for your FREE samples now!

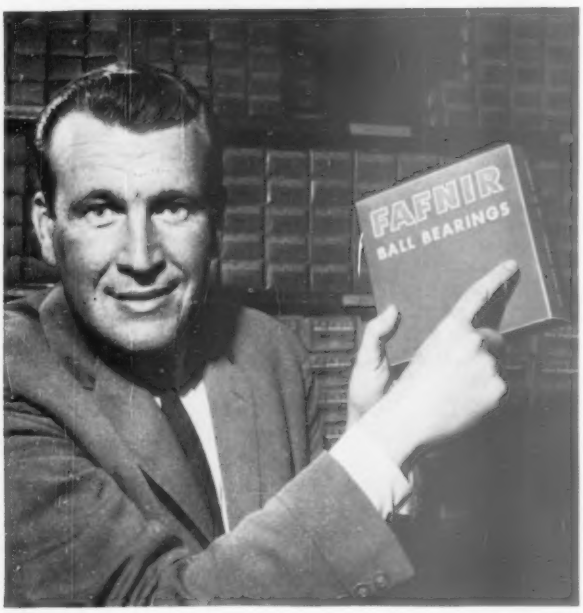
For more facts Circle 532 on Reader Service Card

Here's one good reason for replacing with FAFNIR BALL BEARINGS

Whatever the type, size, or precision you want in ball bearings, Fafnir makes what you need! This complete line features bearings for everything from instruments to machine tools . . . including such pioneering developments as miniature ball bearings of vacuum-melt stainless steel. For diversity, quality, *leadership* . . . look to Fafnir!



...and here's another... your Authorized Fafnir Distributor



Your Authorized Fafnir Distributor has everything you need in ball bearings . . . all types, all sizes, for all purposes. And he's ready to help — day or night — when you need bearings in a hurry!

For job-perfect replacements . . . for top-flight service . . . for sound advice on bearing problems . . . call your Authorized Fafnir Distributor. Like you . . . he is paying his share of U. S. taxes. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS

For more facts Circle 533 on Reader Service Card

ERIEZ Magnetic Minute

60 seconds that will help you improve operating efficiency.

PATENTED

How much will an ERIEZ PERMANENT MAGNETIC PULLEY save you?

Erium® powered Eriez magnetic pulleys save one firm $1200 a year by removing 50 pounds of tramp iron a week from coarse clay. They can save you as much—or more, depending on your application.

In addition to preventing machinery damage, Eriez permanent magnetic pulleys prevent fires and explosions; assure product quality.

The pulley illustrated is one of 192 sizes (up to 36" diameter in any belt width) made by Eriez. **There is one for your exact application.** Two basic models are available: **Type AA,** ideal for separating small and medium tramp iron and fine ferrous contamination; **Type CR,** which performs best in removing large pieces of tramp iron.

All models are engineered and constructed to give you the finest in automatic separation. All are powered by Erium®—our exclusively-designed power source. Model for model, Eriez units give you the finest quality and consistency of magnetic strength.

For descriptive bulletin write to:

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70TA Magnet Dr., Erie, Pa.
ERIEZ of ANADA LTD.
P.O. Box 5, Sta. W - Toronto, Ont.

MAGNA-THOUGHT

We willingly share our design and application know-how to help our customers find new ways to improve their plant efficiency and product quality.

E. J. TENPAS
Supervisor, Magnetic Engineering

ERIEZ

A GROWTH COMPANY...
10 NEW PRODUCTS IN THE LAST 5 YEARS

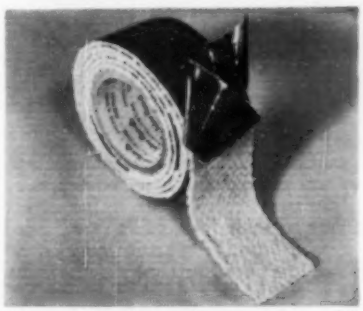
Circle 534 on Reader Service Card

Begins on page 238

MATERIALS NEWS

For more data, circle item numbers you want on Reader Service Card.

206—Silver brazing alloy needs no separate fluxing compound. Eutectic 1020 FC rod is for production or maintenance joining of copper, brass, bronze, stainless. Ideal for poor fit joints; can also bond overheated or burned stainless. *Eutectic Welding Alloys Corp.*



207—Adhesive asbestos tape with pressure-sensitive backing sticks to any surface, saves time during assembly or positioning of parts. Adhesive is self-supporting to 275 F. Rolls are 25 and 50 ft. long, up to 6 in. wide. Thickness from 0.022 to ⅛ in. *Johns-Manville.*

208—Low-cost ribbon strap is flattened galvanized wire to replace steel strapping. Ribbostrap is said to save about 30% over cost of flat band strapping. Five gauges handle light cartons to heavy crates. *Strapping Material Co.*

209—Thread-forming insert is driven into soft metals to save time and eliminate chips from normal tapping. Tap-Lok inserts of hardened steel form threads by means of narrow, threaded lands without creating chips. *Groov-Pin Corp.*

210—Wood flooring adhesive provides a permanent bond between laminated or parquet wood blocks and any floor surface, including concrete. Woodstix compound is non-flammable, water-resistant, and applies with a trowel. Takes 24 hours to set. *Adhesive Products Corp.*

Turn the page

ERIEZ Magnetic Minute

60 seconds that will help you improve operating efficiency.

CLOGGED BINS A PROBLEM?

If troublesome slowdowns caused by sticking, arching, stubborn materials are your problem, here's good news:

Eriez Hi-Vi® electro-permanent magnetic Unit (Bin) Vibrators are your answer. They've proven superior time and again for dependable movement of stubborn masses of granular, lumpy or powdered materials in bins or hoppers.

Their concentrated vibration is directed to deliver maximum efficiency precisely where it is needed. The full Hi-Vi line offers models for use with all sizes of bins with wall thickness to ½" — Special models are available for hazardous, dusty locations.

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- Direct AC operation — no need for rectifiers.
- Lower operating and maintenance costs.
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- Weather-and-dust-resistant housings at no extra cost.
- No sliding or rotating parts.
- No wear, no lubrication.

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The manufacturer who does the most for his customers is the one who is qualified to provide application know-how as well as superior products.

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Supervisor Vibration Engineering

ERIEZ

A GROWTH COMPANY...
10 NEW PRODUCTS IN THE LAST 5 YEARS

Circle 535 on Reader Service Card

EXCLUSIVE NEW FEATURES put the "85" in a class by itself for saving you money in sweeping.

TENNANT "85" SWEEPER *pays for itself fast...*

sweeps a full mile of aisles in less than 30 minutes!

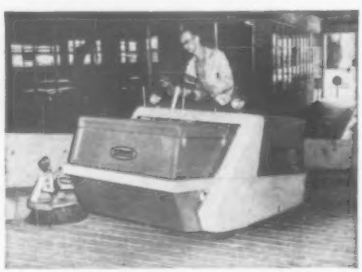
Gliding swiftly over your floors, this all-new, superbly engineered TENNANT "85" Sweeper *sets a new standard in cost-saving cleanliness* . . . plus heavy-duty dependability for *any* job.

In 30 minutes, for example, it easily sweeps a full mile of 8 ft. aisle . . . or over 100,000 sq. ft. per hour in open areas. Leaves an ultra-clean 53" path.

Saves up to 60% in hand-sweeping costs, doing the work of 3 to 12 men. New hydraulic drive, floating brush and simple controls make it easy to use. Your operator does a top notch job the first time.

New features assure exceptional cleanliness, plus added capacity for difficult jobs. *Examples:* Largest filter (66 sq. ft.) on any industrial sweeper . . . powerful 18 h.p. engine . . . new constant-speed brushes and vacuum . . . 16" wheels for good traction on ramps.

100% mechanized operation saves time. Single pedal for forward-reverse; just touch button to clean dust filters; twist of knob dumps 800 lb. load. *Usually pays for itself in less than a year.*



HEAVY-DUTY "85" has ample power for grueling use on ramps and inclines and over bumpy pavements. Path swept (53") is ideal width for sweeping most factory aisles in one round trip.

NEW BULLETIN gives full details on how the "85" slashes sweeping costs. To receive it, simply clip this ad to your letterhead, jot down your name and title and mail to G. H. Tennant Co., 705 G N. Lilac Drive, Minneapolis 22, Minn.

TENNANT

HEAVY-DUTY POWER SWEEPERS

INDUSTRY'S MOST COMPLETE

FLOOR MAINTENANCE SYSTEMS

244 **For more facts Circle 536 on Reader Service Card**

Begins on page 238

MATERIALS NEWS

For more data, circle item numbers you want on Reader Service Card.

MATERIALS LITERATURE

211—Glass ceramics and other types of glass make up the text, and illustrations in "This Is Glass" (9 pages). Covers all phases of glass history and usage, with several pages on industrial applications. *Corning Glass Works.*

212—What are epoxies? That's the subject of this 4-pager which explains the differences between various epoxy formulations. Discusses raw materials, additives, catalysts, modifiers, and diluents. *Hauger-Beegle Associates, Inc.*

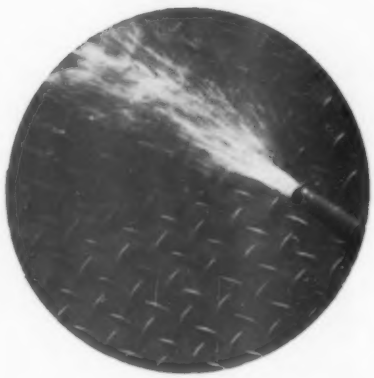
213—Glass roll roofing, plus a liquid emulsion, enables old, badly deteriorated roofs to be repaired quickly. This is described in a 4-page leaflet that notes weight, rot-proof, and economic advantages of this two-part system. *Barley-Earhart Corp.*

214—Pipe insulation made of flexible foam in sheets and form-fitting tubes is explained in this folder. G-B Ultra-Foam has "K" factor of 0.28, snaps on hot or cold pipes, does not support combustion, and won't sag. *Gustin-Bacon Mfg. Co.*

215—Molybdenum lubricant in water-soluble form is the subject of a 4-page report. Gives product specifications, tells how solutions are used in forming, drilling, extrusion, die-casting. Non-toxic, non-gumming, non-flammable. *Bemol, Inc.*

216—Protective coatings for calking, surfacing, and sealing exposed joints are described in 16 pages. Compares durability of various formulations to many different chemicals. *David E. Long Corp.*

217—Metal alloys. Color bulletin (16 pages) includes key characteristics of special wear and corrosion-resistant copper-base alloys. Available in castings, forgings, electrodes, extrusions, etc. *Ampco Metal, Inc.*



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...EASY TO FABRICATE

Shear it, form it, weld it. A. W. Super Diamond is easily fabricated with standard shop equipment. Non-directional pattern matches up from every angle.

...EASY TO CLEAN

Sweep it, hose it, mop it. Unique pattern lets water drain off in all directions. No pockets to hold dirt or water. A. W. Super Diamond is the easiest-cleaning floor plate.

...NON-SKID

No slide, no slip, no skid. A. W. Super Diamond puts your plant on a safe footing. Use it on steps, ramps and walkways —it provides traction even when wet.

WRITE FOR BULLETIN SD-510

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Facts of Light!

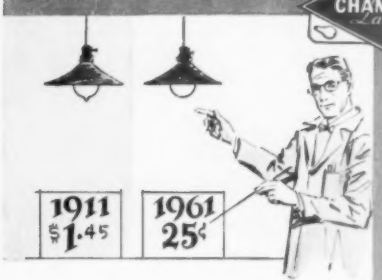
4, 9, 16, 25, 36
THE ARITHMETIC OF LIGHTING

The light you receive from a lamp varies inversely as the square of the distance you are from it. If you are 4 feet from a lamp and move away to 12 feet, you will receive only 1/9 the previous light.

RECOMMENDED ILLUMINATION LEVELS FOR RESEARCH FACILITIES

Seeing Task	Footcandles
Detail drafting, fine detailed model design	200
Instrument readings	100
Rough layout drafting, auditing, tabulating machine operation, calculating	150
Lab test set-up area (where exact quantities are measured)	100
Model set-up area, intermittent reading, intermittent filing	70

CHAMPION Lamps



LIGHT BULBS ARE A BARGAIN

50 years ago a 100 watt bulb cost $1.45. In fact, if 1910 production methods attempted to supply today's demand, a 100 watt bulb would cost about $4.10. Today, you can buy a much better 100 watt bulb for 25 cents list.

OVER 200 INSPECTIONS GUARD CHAMPION LAMP QUALITY.

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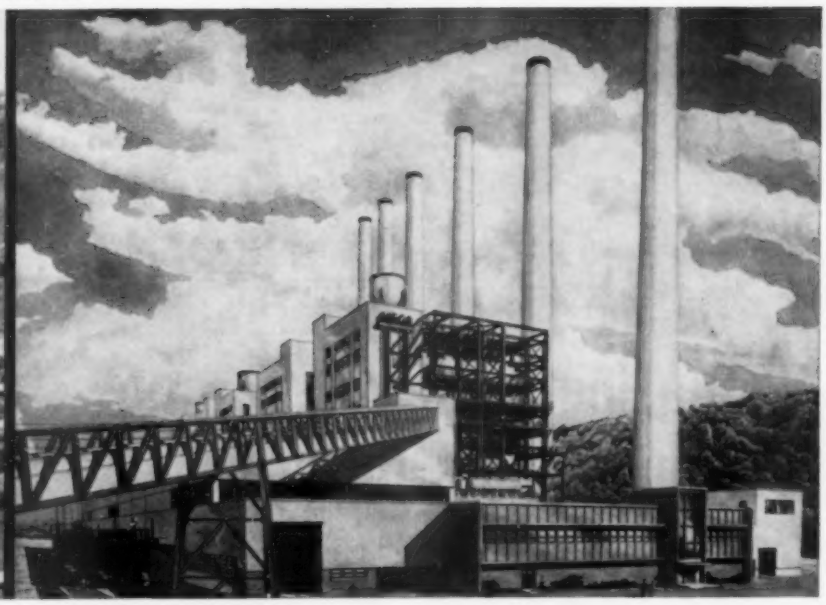
Armco Foundation Products Support $36-Million Power Plant

New steels are born at Armco

Engineers and Consultants: Gilbert Associates, Inc., Reading, Pa.
Piling Contractor: Candler-Rusche, Inc., Detroit, Michigan
General Contractor: Maxon Construction Co., Inc., Dayton, Ohio

Collapsed mandrel, used in driving HEL-COR Pile Shells, is being withdrawn after shell has been driven to required resistance.



Artist's conception of the ultimate plant at the Portland Generating Station of Metropolitan Edison Company, Reading, Pa. In foreground is completed Unit No. 1; behind it is Unit No. 2, now under construction.

Portland Station, Metropolitan Edison Company's new generating plant, is being expanded to house a second unit that will cost $36,000,000.

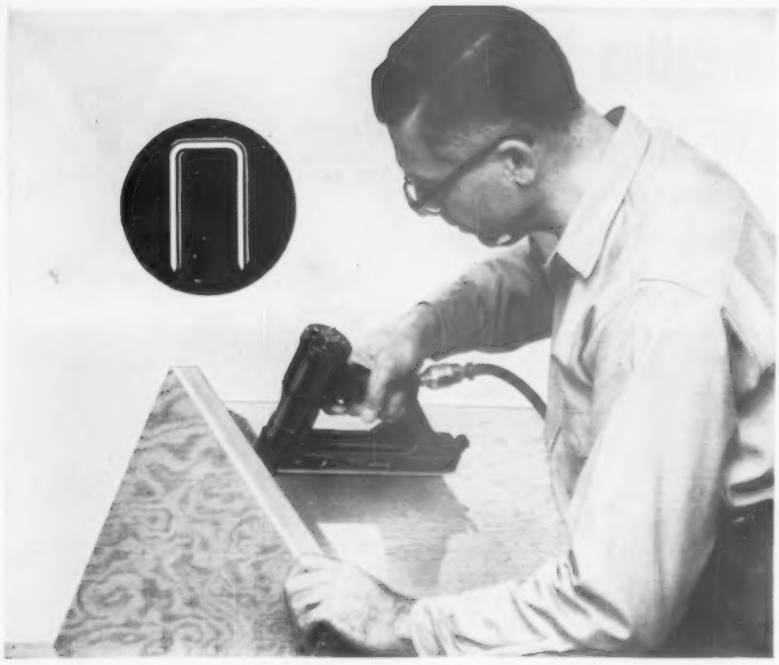
This new unit, with an expected capacity of 250,000 KW, is supported by 54,000 feet of Armco Foundation Piles. More than half of this footage is Armco HEL-COR® Pile Shell, a mandrel-driven corrugated metal pipe. These shells are 12¼" O.D. diameter, supplied in 38- and 60-foot lengths. Remainder of the foundation support consists of welded steel Armco Pipe Piles, supplied in 10- and 12-inch diameters, with .188-inch wall thickness.

Steel

For economy, strength, durability

Armco Foundation Pipe, easy to drive, easy to inspect, provides adequate support for buildings and bridges. For information on Armco Foundation Products, write us. Inquiries are handled promptly by local sales engineers. **Armco Drainage & Metal Products, Inc., subsidiary of Armco Steel Corporation, 6641 Curtis Street, Middletown, Ohio.**

ARMCO Drainage & Metal Products



Amazing what you can do with staplers these days!

Many dollar-saving industrial uses

To mention a few: staple nailing shipping crates and skids . . . assemblies of various wood frame units . . . stapling corrugated cartons and fillers . . . lining boxcars and export boxes . . . and staple tacking in tight areas where you couldn't use a hammer.

DUO-FAST offers you a complete line of stapling equipment. Your job may require air-operated staplers, or it may require hand tackers. Whatever the case, DUO-FAST has the exact model you need and the type of staple.

Find out what DUO-FAST can do for you. Mail the coupon today.

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Send data on DUO-FAST. Interested for:

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BOOKS

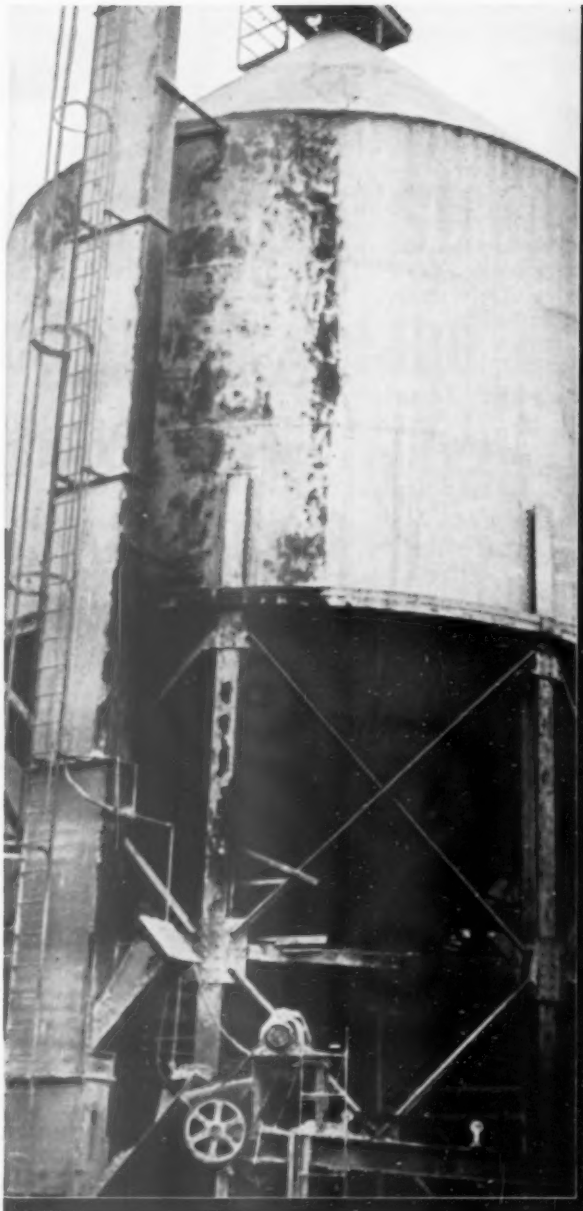
Problem is work, not people

Contrary to the practice of trying to change managers so they become more "human-relations" minded, the authors of a brilliant new book, *Measure of Management*, urge that the structure of the work flow be changed instead. Professors Eliot D. Chapple and Leonard R. Sayles contend that human relations problems arise whenever breaks in work flow occur. It is the interaction, they say, between an individual and methods, systems, and technology which causes people to be dissatisfied and non-productive. Personality changes are difficult to achieve. It's simpler —and more effective—to provide organizational changes.

The authors cite a plant case involving assignments of material handling, quality control, maintenance, and production supervision. The original system had each function under separate supervision reporting directly to the vice president for manufacturing. As a result, the plant was in a constant state of turmoil with the vice president called upon frequently to settle disputes between departments.

Under a changed organization, material handlers report directly to production. A distinction is made between long-range planning and day-to-day scheduling. The foremen now control the latter, but two planners coordinate the daily variations and relate them to long-range schedules, which involve the purchasing of parts and raw materials. Inspection now reports directly to supervision. Quality control, however, which does not interfere with the production process, remains centrally supervised. The chief mechanic no longer has direct control over area mechanics, who now report to department foremen. And the chief mechanic now has only a functional responsibility for training and performance standards of the craftsmen. As a result of these changes, the authors report, conflicts have ended, delays are minimized, and costs are lower.

In addition to changing the work-



New Defense Against Corrosion

(and Mounting Maintenance Costs!)

Du Pont CORLAR(T.M.) Epoxy Enamels Afford Excellent Resistance to Chemical Spills and Fumes, Moisture and Heat up to 400° F.

Now a new kind of protective finish can help you solve *difficult* corrosion problems—and hold down skyrocketing maintenance costs. CORLAR Epoxy Chemical-Resistant Enamels combine excellent resistance to atmospheres containing mineral acids, alkalies, strong aromatic and aliphatic solvents with remarkable adhesion and heat resistance. They're also easy to handle, weather well, remain flexible at low temperatures.

Key to the success of these new coatings is a polyamide activator that binds molecules into a hard, firm film that literally *locks out* corrosion. Amide activator also makes CORLAR finishes safer to use and more stable; gives them 10-15 times longer pot life than amine types. Moreover, the epoxy resin's outstanding adhesion helps coatings stand off deterioration for years.

Two-package CORLAR Epoxy Enamels can be used indoors or out with equal success, apply easily with brush, roller or spray. Five standard colors are available, as well as black and white.

For prolonged exposure to severe mineral and organic acids, use Du Pont IMLAR(T.M.) vinyl coatings. See your local Du Pont sales representative for expert technical help. For more detailed information on these new finishes, clip and mail the coupon *today*.

Tested and proven on the job. After three years of continual exposure to corrosive fumes, moisture and salt spray, CORLAR coating on right side of lime tank is still in good condition. Commonly used phenolic resin coating on left side, however, has deteriorated completely—permitting rust and corrosion to take over.

CORLAR(T.M.)

Epoxy Chemical-Resistant Enamels

DU PONT

Reg. U. S. Pat. Off.

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Please send me, without obligation:

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- ☐ Du Pont Technical Bulletin, "IMLAR Vinyl Coatings"

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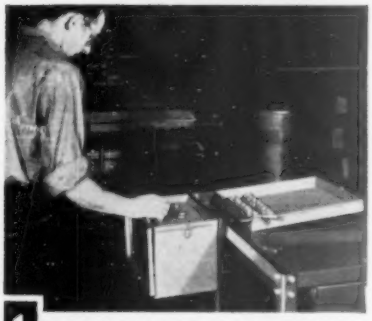
3 Ways to Increase Production



1 PROVIDE PARTS CLEANING SOLVENT CANS AT THE MACHINE

Keep machinists doing productive work—eliminate unnecessary trips to centrally located parts cleaning station. Machine Bench Can attaches to machine or bench. Depressing fire safe Dasher dips parts; releasing pressure returns parts for draining. 10" x 7" x 8" deep; Capacity 2 gallons.

2 CLEAN SMALL PARTS AT WORK STATION IN AIR OPERATED MACHINES

Clean small machined parts in flammable solvents safely and automatically with Protectoseal Air-Matic Parts Washers. Require no attention from operator during wash cycle. Parts in basket are moved through solution to provide effective cleaning action. Operate on 35 psi. Cap. 6 gal; 30 lb. basket load; 15" x 15" x 25½" deep.

3 APPLY FLAMMABLES WITH AUTO MATIC PLUNGER CANS

Use automatic, fire safe Protectoseal Applicating Cans for assembly or cleaning operations requiring use of flammable solvents. Depressing dasher pumps a measured quantity of solvent into dasher cup to dampen swab, brush, or sponge. Saves time, solvent, reduces toxic or explosive vapor hazard. Made in 7 sizes; capacities to 2 gallons of solution.

Write for Protectoseal Catalog of fire-safe products for handling, dispensing, and use of flammable liquids in production operations.

THE PROTECTOSEAL COMPANY
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Begins on page 248

BOOKS

flow patterns, the authors suggest transfer of personalities from situations they can't handle to those "within which their interactional patterns make it possible for them to adjust." Taken together, these refreshingly new points of view make a significant contribution to our understanding of human relations problems and solutions in industrial organization. (Reviewed by Lester R. Bittel).

The Measure of Management, by Eliot D. Chapple and Leonard R. Sayles. The Macmillan Co., 60 Fifth Avenue, New York 11. 218 pages. $6.50.

Cost reduction

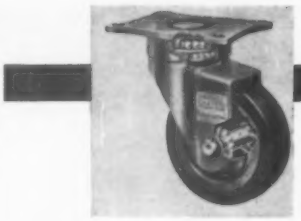
This book includes many suggestions that can guide a plant to immediate savings. But its real purpose and value is as a manual for the company or plant that wants to set up or rejuvenate a continuing cost-reduction activity. The authors are cost-reduction consultants and they give generously of their experience and fund of knowledge in this book.

The contents cover step-by-step instructions for starting and continuing cost reduction, including sample forms and reports. A 1200-question checklist will help find cost-cutting opportunities. Case studies illustrate the practical application of successful cost-reduction principles and procedures.

Cost Reduction Guide for Manufacturing Management, by E. E. Wyatt and H. C. Morse. Hitchcock Publishing Co., Wheaton, Ill. 256 pages. $18.

The hows and whys of supervisory training

Supervisory training is the subject of this comprehensive yet easy-to-use *AMA Encyclopedia*. The material is well indexed—complete with marginal tabs—and presented in a man-sized ring binder. It's loaded with case studies, illustrations, and examples of practices that are actually doing a job in some of the best-managed companies in the



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CASTERS & WHEELS
THE BEST ANSWER IS INVARIABLY
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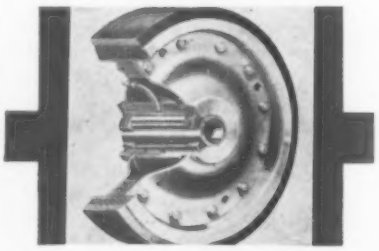

There is a type of Darnell Caster or Wheel for every kind of use and floor. Made for light, medium and heavy-duty service, you are sure to find in the Darnell line the exact caster or wheel to meet your individual requirements . . .

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IT'S BOUND TO BE BETTER WITH USS STEEL STRAPPING

Round Steel Strapping carries the load at Carborundum... cuts costs in half!

Slings made from strong 8-gauge USS Round Steel Strapping hoist 2500-pound palletized loads of "Ferrocarbo Briquettes" at the Electro Minerals Division of Carborundum Company. According to Mr. S. E. Eggleston, Supervising Engineer, "We needed a safer method for lifting our briquette loads. Normally, we use steel strapping just for bundling and palletizing, but we found that these preformed slings were strong enough to lift heavy loads. And the USS Model G Strapping Machine gave the right tie so the slings wouldn't break, slide, or deform. They lift, carry, and lower our loads safely and securely . . . and cut our material costs by 50%."

The loads consist of 30 briquette cartons tied down by USS Round Steel Strapping . . . it makes a neat, compact package. The entire strapping operation including the lifting slings takes Carborundum only 6 minutes. Round steel strapping cuts labor time 10%, eliminates shipping delays, ends customer complaints because merchandise arrives undamaged.

U. S. Steel Supply furnishes both round and flat steel strapping, automatic and semi-automatic strapping tools . . . and our strapping specialists are ready to assist you in *any* packaging, palletizing, and car-loading operation. For more information, send the coupon.

U. S. Steel Supply
Division of
United States Steel

TRADEMARK

U. S. Steel Supply
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Please send me more information on USS Round and Flat Steel Strapping.

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Company_____

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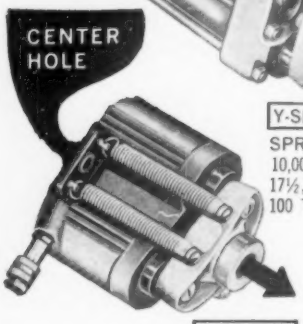
For more facts Circle 546 on Reader Service Card

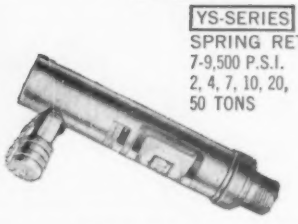
New OTC 10,000 p.s.i. Hydraulic Cylinders

- PRECISION BUILT, POWERFUL, COMPACT, LIGHTWEIGHT
- THE FIRST ADVANCES FROM OTC'S NEWLY FORMED "PRECISION HYDRAULICS DIVISION"



OTC 10,000 P.S.I. hydraulic cylinders open new possibilities in "hi-pressure" designing by meeting high force requirements with compact, lightweight components. Cylinders are precision built for dependable, continuous performance. Choice of stroke length and standard or tie-rod extension mountings for YD, YDS and YDT series cylinders. Requests for quotations invited.

New two-stage and single-stage 10,000 P.S.I. hydraulic pumps and power packages also available.



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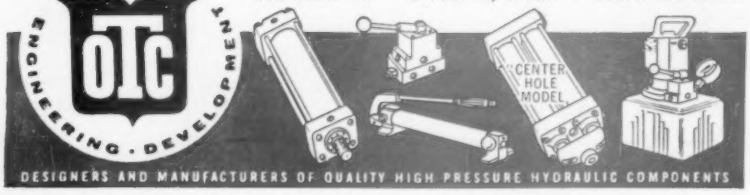


BOOKS

Begins on page 248

country. It tells what is being done, why, how, and in what order.

The introduction points out how and why supervisory training has grown, why programs often go sour, what training will and will not accomplish, who should conduct it, and how it should be done. While sweeping away a lot of the mythology that has sprung up around the job of the supervisor and the way he should be trained, it comes down hard on the folly of trying to find a perfect program for one company in the successful activities of another. The book presents a collection of ideas that can be adapted.

AMA Encyclopedia of Supervisory Training. American Management Assn., Inc., 1515 Broadway, New York 36. 451 pages. $22.50.

* * *

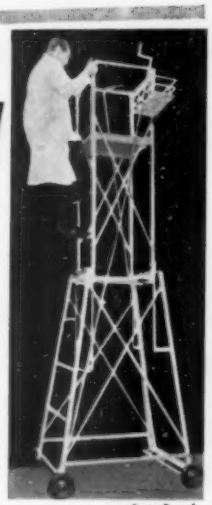
Assignment Management is a guidebook for middle-management men. Emphasizing the need for accurate self-appraisal, it outlines the qualities required in a top-flight manager. These are: ambition, judgment (maturity, self-control, self-reliance), stamina (perseverance under pressure and overwhelming opposition), organizational and administrative abilities, ability to plan, and communication skills. The book tells how to achieve a smooth-running organization, what's needed to be a good planner, and how to become a successful leader.

Assignment Management, by J. M. Black. Prentice-Hall, Englewood Cliffs, N.J. 224 pages. $5.95.

Physical Distribution Management should be required reading for every plant man nibbling at the edges of physical distribution in warehousing, inventory control, traffic, or material control. This first book on the subject puts into perspective the overall importance of coordinating all aspects of distributing the product to the customer.

Physical Distribution Management—The Logistics Problem of the Firm, by Edward W. Smykay, Donald J. Bowersox, and Frank H. Mossman. The Macmillan Company, 60 Fifth Ave., New York 11. 284 pages. $8.

He propels "MOVE-ON" along without climbing down



As soon as the man on the platform has finished one job, he can WITHOUT CLIMBING DOWN, propel "MOVE-ON" to the next, no matter whether it is in front, behind, or even around a corner. Ideal and economically priced for decorators, electricians, cleaning and maintenance men and all other overhead workers.

Pat. Pend.
SELF-PROPELLED STAGING
For quicker, safer, cheaper overhead work

Two Models Are Available:
MODEL "B" (Illustrated) gives working heights up to 16 ft.
MODEL "A" gives working heights up to 11 ft.

***WRITE** for further information and name of nearest dealer*

ANDERSTON CLYDE, INC.
DEPT. C—P.O. BOX 763
METAIRIE, LOUISIANA

For more facts Circle 548 on Reader Service Card

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Adheron*

epoxy coatings

METAL . . . WOOD . . . MASONRY

STOP ACID ATTACK

Send for free literature today. Learn how Adheron epoxy products can help you cut maintenance costs. Get *positive* protection against acids, alkalis and corrosive fumes.

**Proven during more than 5 years of industrial use*

Hauger-Beegle
ASSOCIATES, INCORPORATED
7250 Franklin • Forest Park, Ill.

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ROPER PUMPS

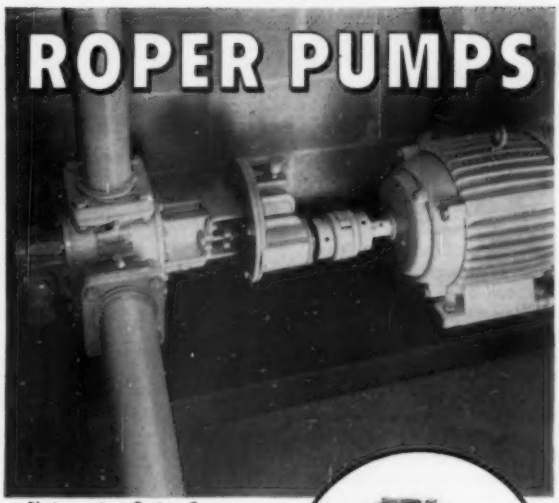


Photo courtesy Custom Canners, Atlanta

Series 3600

supply high viscosity liquid sugar in canned soft drink operations

OUTPUT CAPACITY: 40-300 GPM • PRESSURES TO 100 PSI

The Potter & Rayfield liquid sugar system installed for Custom Canners, Inc., producers of canned soft drinks, uses Roper Series 3600 MAHBRV #4 as the pumping component. Specification of a Roper unit for the system was made to handle the 10,000 SSU viscosity of the 50% inverted liquid sugar at 60°F, and lower, temperatures. The installation requires consistent output at slow pump speeds. Batch-type production means intermittent pump service, but the unit still handles some 1500-3000 gallons per day. In addition, unloading, transfer to storage, and movement of syrup to mixing vats are handled by the Roper pump, which is connected to a 1800 rpm, 7½ hp motor. Standard, specially modified, and custom Roper units serve original equipment in a wide range of industries—marine, process, chemical and petroleum. A Roper can serve the needs of your equipment also.

Balanced Construction–Reliable Production

- **Axial Hydraulic Balance** of the gears provides vibration-free operation; smooth, pulsation-free output.
- **Gear Construction** includes special machining for tooth forms to insure correct meshing and efficient displacement.
- **Induction Hardening** of steel shaft at bearing and packing surfaces means longer, maintenance-free service.
- **Four High-Lead Bronze** or chrome-iron bearings give balanced support and maintain proper alignment for the helical-type pumping gears. Sleeve bearings are heavy-duty bronze.

For full information about your specific pump needs, contact your nearest Roper dealer

Send for "How to Solve Pumping Problems" booklet

ROPER HYDRAULICS, INC.

Dependable pumps since 1857

COMMERCE, GEORGIA

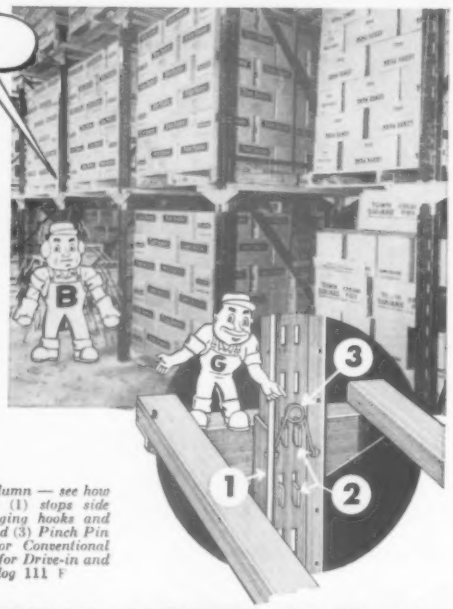
For more facts Circle 550 on Reader Service Card

DRIVE-IN DRIVE-THRU Ridg-U-rak® SYSTEMS

Fill the cube with loaded pallets or skids

"BABY, IT'S COLD IN HERE"

"RIDG-U-RAK" Drive-in System stores frozen food products, fills the cube, floor to 18 foot ceiling. "Ridg-U-raks" replace another make of storage rack that could not take the 25° below freezing temperatures. Husky "Ridg-U-raks" fully standardized, feature exterior column flange, double engaging hooks and slots, plus pinch pin locking to secure every column connection without tools, bolts or nuts. Pallet Rails are secured to Rail Supports with an ingenuous single fastener that prevents movement in any direction.



Look behind a "Ridg-U-rak" Column — see how the full length Column Flange (1) stops side movement and (2) double engaging hooks and slots stop downward movement and (3) Pinch Pin stops all vertical movement. For Conventional "Ridg-U-raks" Catalog 107 F, for Drive-in and Drive-thru "Ridg-U-raks" Catalog 111 F

BERNARD GLOEKLER NORTH EAST CO.
NORTH EAST, PA.

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IT'S A SNAP

to keep life in FLEXOLINE lists without recopying

Snap out dead listings. Snap in new names in exactly the sequence you want. Type only fresh additions...in seconds...on scored sheets that separate into springy strips. Flexoline frames in hinged stands or rotaries hold thousands of strips for instantly visible reference. Perfect for listings of parts, phone information, cross files, account numbers, routing guides and hundreds of other active records. For more information, send the coupon now.

ACME VISIBLE

ACME VISIBLE RECORDS, INC.
3106 West Allview Drive, Crozet, Va.
Please give me full facts on time and money saving Flexoline reference systems.

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE____

FILMS

Eastman 910 Adhesive shows assembly-line procedures that make use of company's adhesive in a number of bonding operations. These applications include rubber-to-metal bonds, assembly of miniature electronic components, and metal-to-metal bonding. 16mm, sound, b&w, 15 min. No charge. Write to:

Eastman Chemical Products, Inc., 260 Madison Ave., New York 16.

The Science of Fire takes up the principles of combustion and ways to prevent fires. It covers flash points, ignition temperatures, vapor travel, and methods of extinguishment. Color, sound, 16mm, 20 min. For loan, write to:

Bureau of Communication Research, Inc., 267 W. 25 St., New York.

Municipal Fire Fighter covers all types of John Bean fire-fighting equipment: high-pressure fog and volume units, squad and rescue equipment, combination pumpers, and special-purpose equipment. Shows student firemen in action at company's fire school. Color, sound, 16mm. For loan, write to:

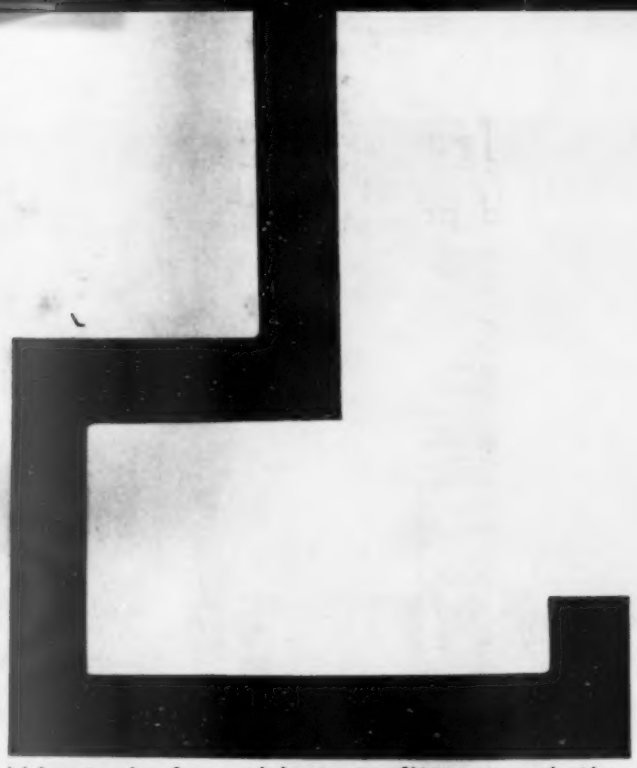
Food Machinery & Chemical Corp., John Bean Div., Lansing 4, Mich.

Resuscitation — Mouth - to - Mouth demonstrates why this life-saving technique is the preferred one. Shows application to victims of asphyxiation caused by drowning, smoke and poison fumes, electric shock, severe head injuries, crushed chest, drug poisoning and carbon monoxide poisoning. 16mm, animated, color, 23 min. $165. Write to:

United World Films, Inc., Govt. Dept., 1445 Park Ave., New York.

Servicing the Electric Clarklift is a two-part film showing how to keep electric fork trucks in top operating condition. The first section explains the basic principles of electricity, describes testing instruments, shows trouble-shooting techniques. The second part is a detailed study of company's control system. Slide, color, 21 min. each. Free. Write to:

Clark Equipment Co., Industrial Truck Div., Service Engineering Dept., Battle Creek, Mich.



Wanted: A problem to fit our solution

Somewhere, there's an engineer with an industrial control problem. We don't know what it is, but we'd like to meet him. We don't even know what industry he works for.

We know it isn't the tobacco industry.

You see, we've been in the tobacco machinery business for over fifty years. As a matter of fact, American Machine & Foundry Company's Standard Cigarette Machine revolutionized the world's smoking habits in 1907, and AMF has kept its lead in this field ever since.

The reason? AMF research and development teams, involving over 1600 scientists working all over the world, have consistently come up with machinery to solve the tobacco industry's problems more efficiently and more profitably. Engineers in the tobacco industry know all this. But, our R&D people tell us that many of the machines we are selling to the tobacco industry have potential application to other industries.

What other industries? They can't tell us – yet.

They can tell us what general areas are most likely to produce the kind of problems for which they have the solutions. A maker of a small packaged product, like soap or a pharmaceutical, where accurate weight control is the difference between profit and loss; a maker of a packed and cartoned product (playing cards? candy?) may be interested in a packing machine that can be adapted to his product. A processor of a large, loose raw material may be interested in how AMF developed tobacco leaf handling and processing systems —and want to apply the same know-how to wasteful, uneconomic hand operations. The use of electronics as a method of control of high-speed inspection, correction and packaging may interest another industry.

The engineer we're looking for is pondering his problem. We wish he'd let us ponder it with him.

TOBACCO MACHINERY GROUP
AMERICAN MACHINE & FOUNDRY COMPANY
EXECUTIVE OFFICES, AMF Building, 261 Madison Avenue, New York 16, New York

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Bologna · Frankfurt · Geneva · London · Mexico City · Paris
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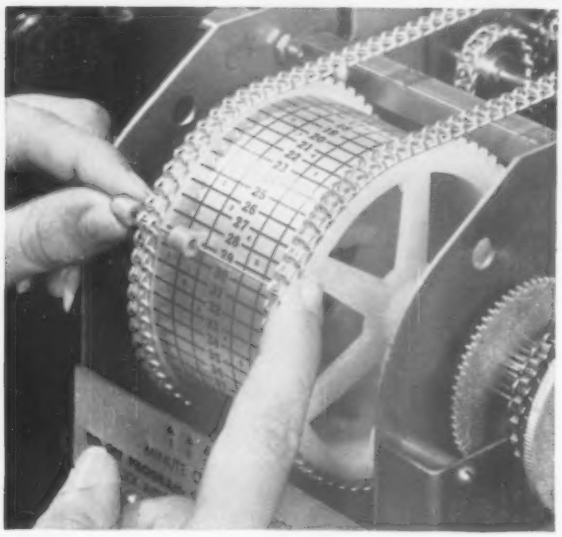
HOW TO

SET A SIGNAL PROGRAM SCHEDULE



THE EASY WAY WITH A Cincinnati CLOCK AND PROGRAM SYSTEM

Push a roller on a pin—Your signal is set. It's that simple with a Cincinnati System! Anyone can set a signal program schedule in minutes. No tools are required. And, pins and rollers are re-usable.

Contrast this simple procedure with any other system.

You'll also find features like wall or flush mounting and the exclusive swing-out construction make a Cincinnati System simple to install and maintain. There's also an automatic 12 hour reset correction and spring reserve to help overcome power failure and assure continuous, accurate signal and clock operation.

Get the complete story by contacting your nearby Cincinnati representative; or, send for your free copy of the "Time Systems Handbook" covering "Clock and Program" and "Fire Alarm" systems.

IF IT'S ABOUT TIME . . . CALL FOR . . .

THE Cincinnati TIME RECORDER CO.
1737 Central Avenue
CINCINNATI 14, OHIO
SINCE 1896

Gentlemen:
Without charge or obligation, please send my new "Time Systems Handbook."
—A basic guide to clock and program systems.

Name _____
Address _____
City _____ State _____
Organization _____ Position _____

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

ELECTRICAL

275—Motors. "The Fine Art of Building Better Motors" is yours for asking. Crocker-Wheeler Div., Elliott Co.

276—Relay. Booklet (ED-LO-79-L211) on new compact 300 relay; controls up to 8 circuits. Cutler-Hammer, Inc.

277—Insulation. Get "Specify Silicone Insulation and Save" . . . your electrical equipment. Dow-Corning Corp.

278—Low-voltage switchgear. GED-4269 covers new Powermaster Type AKD-5 switchgear. General Electric Co.

279—Pushbuttons. GEA-7127 tells all about new electric miniature oil-tight pushbuttons. General Electric Co.

280—Adjustable-speed drive. Bulletin on "package"—drive motor, operator's station, all controls. Square D Co.

281—Adjustable speed drives. Bulletin GEA-6806 gives complete details on polydyne drives. General Electric Co.

PACKAGING & SHIPPING

282—Steel strapping. Full information on round and flat steel strapping. Versatile, economical. U. S. Steel Supply.

283—Rust preventive. Two helpful charts give industrial, government specifications and uses. Valvoline Oil Co.

284—Scales. Bulletin 2017 gives full information on maker's line of Printweigh scales. Toledo Scale Div.

285—Stapler. Data on multi-purpose stapler for nailing shipping crates, stapling cartons, etc. Fastener Corp.

MECHANICAL

286—V-Belt drives. Bulletin on Dyna-V Drives. Available for capacities from 1 to 1500 hp. Dodge Mfg. Corp.

287—Cam followers/yoke rollers. Handy, quick reference sheets on both. Smith Bearing Div., Accurate Bushing Co.

288—Speed reducers. Book 2824 on complete line of fan-cooled worm gear speed reducers. Link-Belt Co.

289—Gear drives. Catalog No. GH-59 on 1250-hp. precision ground helical gear drive. Philadelphia Gear Corp.

Turn the page

DENNISON DIAL-SET MACHINE, with its twist-of-the-wrist copy changing, imprints FANSTEEL'S 5-STUB TAG with information for 12 production operations, product and customer identification, and shipping quantities.

FANSTEEL SAVES $5,500 A YEAR with this Dennison Dial-Set Imprinting System!

Before Dennison Dial-Set, Fansteel Metallurgical Corporation, leading supplier of tantalum capacitors, silicon and selenium rectifiers, refractory metals, electrical contacts and carbide tools, used a liquid duplication method to add variable information to pre-printed system tag forms. Average run was 125 tags.

Fansteel studied comparative costs of liquid duplicating versus other imprinting methods . . . and found that costs of master stencils, tag forms, preparation and processing were excessively high. Dennison Dial-Set was selected to cut the costs. It was a wise choice.

Since Dennison Dial-Set, Fansteel has cut costs three ways. First, savings in tag forms alone total about $1500 a year because liquid duplicating required coated stock. Second, the cost of master stencils, approximating $3000 a year, was eliminated. Finally, Dial-Set's "twist-of-the-wrist" copy changing and 165-impressions-a-minute imprinting speed cut preparation time 75%. No typing stencils for each run and retyping them after 125 impressions. Moreover, the neatness and ease of the Dennison Dial-Set method improved employee morale.

A dollar analysis of your present imprinting method and a cost comparison with Dennison Dial-Set involves no obligation. It may reveal that a Dennison Dial-Set System is the most efficient, most economical method of adding variable information to your pre-printed forms . . . tags, cards or labels. For your free analysis, contact the Dennison office nearest you or write direct to: Dennison Manufacturing Company, Machine Systems Division, Dept.

Dennison

Helping you compete more effectively

FRAMINGHAM, MASSACHUSETTS

For more facts Circle 555 on Reader Service Card

Powell FLOW-MATIC system discharges box contents automatically, via gravity feed, at proper work level. Lift truck has easy access to load and unload boxes.

POWELL FLOW-MATIC®

trims handling time 30%, saves 20% in storage space

Federal-Mogul Division improved its bulk handling of small parts with a low-cost Powell FLOW-MATIC materials handling system. Its Cleveland Plant gained more than 20% in limited floor space, saved 30% in handling time . . . while producing 60-80 million bushings, spacer tubes and washers yearly.

Simplify your production, handling and storage with the Powell FLOW-MATIC system. Write for *Bulletin FM* today.

THE POWELL PRESSED STEEL COMPANY

DEPARTMENT 101-6 • HUBBARD, OHIO

Materials handling is our only business

Powell FLOW-MATIC systems reduce handling time as much as 48%.

Begins on page 256

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

290—Gears. Catalog 57 lists complete line of 1781 types and sizes, from 48 to 3 pitch. Boston Gear Works.

291—Multi-V, multi-wedge drives. New catalogs on drives to help you reduce number of belts, etc. Worthington Corp.

292—Variable speed pulleys, sheaves. Catalog on pulleys with speed ratios to 3:1; ⅛ to 15 hp. Worthington Corp.

293—Centrifugal clutches. Catalog on fully automatic clutches. Two basic models. Worthington Corp.

294—QD adapters. New catalog describes features. Can be welded or machined for mounting. Worthington Corp.

PRODUCTION

295—Hose, fittings. Industrial catalog No. 205 covers full line of hose and re-usable fittings. Aeroquip Corp.

296—Recorders. Folder gives information on both mechanical and electrical models. Service Recorder Co.

297—Hydraulic cylinders. Free engineering data file catalog on new 10,000-psi. cylinders. Owatonna Tool Co.

298—Flexible hose. Catalog ID-100E lists line of all-metal flexible hose and assemblies. Universal Metal Hose Co.

299—Visible records. Full facts on time- and money-saving Flexoline reference systems. Acme Visible Records, Inc.

300—Bins. New product bulletin and prices on all-plastic bins for flexible assembly stations. Stackbin Corp.

301—Cut-off machine. Literature and prices on Model 8CW-B1 automatic cut-off machine. Kalamazoo Tank & Silo Co.

302—Pumps. Booklet, "How to Solve Pumping Problems" in handling transfer of liquids. Roper Hydraulics, Inc.

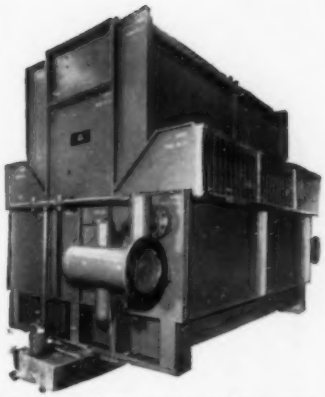
303—Vibratory feeders. Descriptive bulletin on full line—from ounces to many tons per hour. Eriez Mfg. Co.

304—Safety containers. Catalog of fire-safe products for handling flammable liquids. Protectoseal Co.

305—Electronic controls. New catalog describes wide selection for heavy-duty industrial equipment. Autotron, Inc.

Turn the page

You Get EXTRA SAVINGS From This Method of Compressed Air After Cooling



Cooling water savings and power savings quickly repay the cost of the Niagara Aero (air-cooled) After Cooler for compressed air or compressed gases. In addition its long life and the labor-saving simplicity of its maintenance give you an extra profit in comparison with water-cooled surface contact methods.

With the Niagara After Cooler the heat of compression is removed and dispersed into the atmosphere by the evaporation of a very small amount of water. The compressed air temperature is always brought below that of the atmosphere surrounding your air lines, so that no further condensation can take place.

Large users of compressed air for plant services or processes choose Niagara Aero After Coolers for their dependable durability. They have been making good records of service for over 25 years.

Write for Bulletin 130.

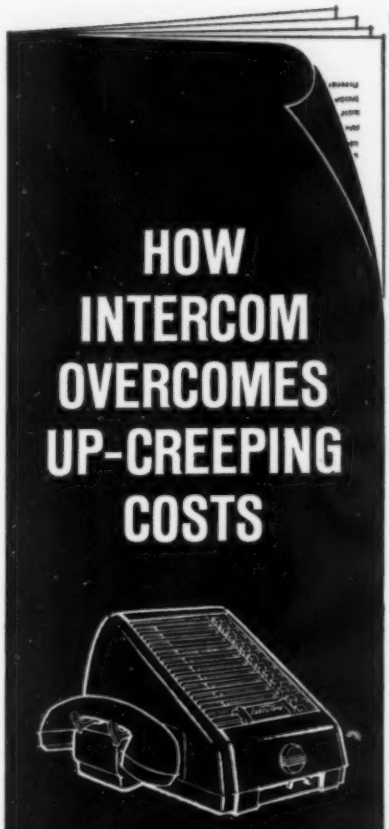
NIAGARA BLOWER COMPANY
Dept. F-6, 405 Lexington Ave., New York 17, N. Y.
Niagara District Engineers in Principal Cities of U. S. and Canada
For more facts Circle 557 on Reader Service Card

HOW MUCH did your plant contribute to the $6 BILLION LOSS due to corrosion?

VALDURA VAL-CHEM COATINGS *STOP* costly corrosion

Your plant's share of the tremendous loss to corrosion last year could have been stopped with one of Valdura's Val-Chem chemically-resistant coatings. Remember—no one coating can solve all the problems. That's why Valdura offers you a *complete line* to fit every need—the new, field-tested Val-Chem Coatings. The assistance of Valdura's nationwide force of field representatives—experts in corrosion control—is at your service. How can Val-Chem Coatings stop corrosion in *your* plant? Write today on your letterhead for a prompt solution!

VALDURA HEAVY DUTY PAINT DIVISION
AMERICAN-MARIETTA CO., CHICAGO 11, ILL.



Get all the facts now in this new FREE BOOKLET

Learn how Executone intercom can cut the many costs that put the squeeze on profits. Executone can: reduce your monthly telephone bill . . . cut accounting costs by simplifying data gathering . . . limit down-time by speeding assistance to trouble spots . . . cut idle personnel time between jobs . . . eliminate time wasted waiting for switchboard jam-ups to clear . . . a dozen other ways that a flexible, internal communication system will help a company avoid the continuing profit-squeeze. Cost-minded executives will find much to stimulate them in this revealing booklet.

Executone
Dept. C-8, 415 Lexington Ave., N. Y. 17, N. Y.
Send me your free Executone booklet.
Name_____
Company_____
Address_____
City_____ Zone___ State_____

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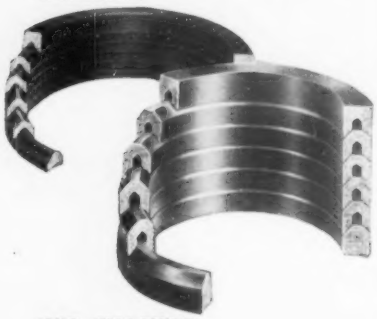
Circle 559 on Reader Service Card

BONUS VALUE

You gain the extra advantage of alert, local service when you specify popular Palmetto® packings.

For maintenance use, Palmetto is offered exclusively through the industrial distributor. His Palmetto-trained specialists are quickly available to give on-the-spot advice . . . his local stocks insure immediate delivery of stock items.



FOR EXAMPLE

On hydraulic extrusion presses, steel forming presses, presses for injection molding, rubber molding, and other uses: **PYRAMID**® V-packing lasts longer, improves performance. Palmetto's advanced design reduces friction, will not spiral, resists over-compression.

Your Palmetto Distributor is best suited to help you select the correct **PYRAMID** composition style. . . insure that it arrives promptly and operates to your complete satisfaction.

Ask for molded packings Catalog MP, and for the name of your nearest Palmetto Distributor.

PALMETTO PACKINGS

GREENE, TWEED & CO.

OUR 99TH YEAR

NORTH WALES, PA.

Begins on page 256

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

306—Assembly power tools. Bulletins on air-powered assembly tools with new clutch feature. The Rotor Tool Co.

307—Industrial TV. Write for copy of closed-circuit TV system-planning guide. Gives applications. Philco Corp.

308—Paint remover. Complete details on compound for removing paint on production rejects. Gunk Laboratories, Inc.

309—Temperature controller. Bulletin MC-195 describes versatile multi-option controller. Fenwal, Inc.

310—Photoelectric control. Brochure NR-6 gives data on automatic industrial processes. Standard Instrument Corp.

311—Schedule boards. Bulletin X-100 (24 pages) shows applications of visual control boards. Graphic Systems.

312—Drill presses. Brochure describes line of 20-ft. drill presses in varied models. Rockwell Mfg. Co.

MATERIAL HANDLING

313—Conveyors. Catalogs cover full line of conveyors—single components or complete systems. Link-Belt Co.

314—Floor trucks. Details on complete line of aluminum floor trucks for varied use. Wear-Ever Aluminum, Inc.

315—Tractor shovel. Data on H-30 4-wheel drive bulk-handling tractor; 3000-lb. capacity. The Frank G. Hough Co.

316—Casters, wheels. New manual describes over 4000 types of casters and wheels. Darnell Corp., Ltd.

317—Hoists. Here's literature on line of electric and air hoists, chain blocks. Manning, Maxwell & Moore, Inc.

318—Overhead conveyors. No. RK-13 covers overhead systems for handling empty containers. Rapistan-Keystone, Inc.

319—Steel shelving. Catalog (100 pages) on line of clip and stud shelving, other products. Lyon Metal Products, Inc.

320—Storage racks. Information on flexible air-row head racks with only two basic parts. Equipment Mfg., Inc.

321—Self-dumping hoppers. Literature tells how to cut handling costs 50%. Eight sizes. Roura Iron Works, Inc.

Turn the page

EVANS WHITE TAPES

Sizes from 6 ft. to 12 ft.

NOW EACH IN BELT HOLSTER

CLIPS ON BELT!

Now, Evans gives industry more big savings in measuring tapes! Greater convenience and performance — with no increase in cost! Every Evans pocket tape, push-pull and power models, comes packaged in a strong, metal-reinforced vinyl-covered holster with belt clip. Makes measuring faster, tapes always handy. Your supplier will gladly demonstrate. Ask him about this Evans "extra" today.

YOUR COMPANY NAME ON TAPES . . .

Evans tapes can be supplied with your company name and advertising on each tape for presentation to your customers. It's a wonderful way to build good will. Available in individual gift package.

Send for illustrated folder #5807.

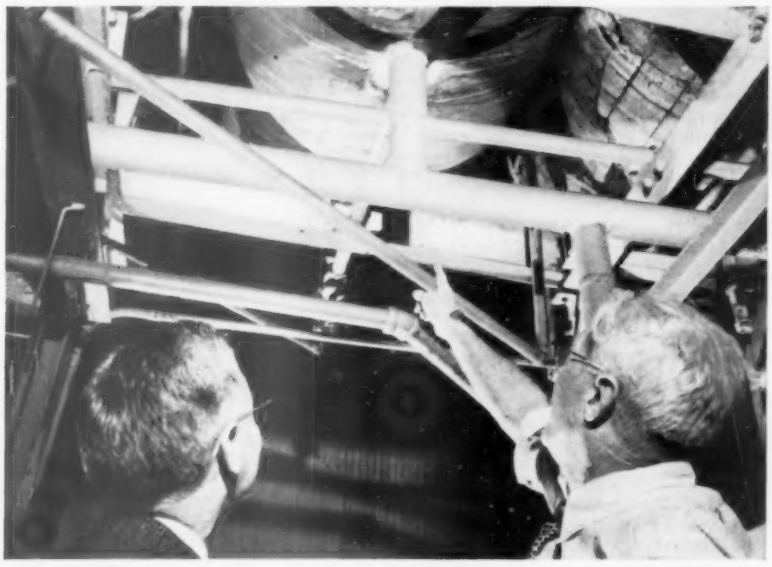
Evans RULE CO.

Factories at:

Elizabeth, N. J. & Montreal, Quebec

BYERS GUIDE

Tips on Reducing Corrosion Costs from A. M. Byers Company VOL. 2, NO. 7



R. W. Williamson, Plant Engineer (left), and William Slack, Master Mechanic for Columbia Steel & Shafting Company, Carnegie, Pa., examine a 4-inch Wrought Iron feedwater line running from the make up tanks to the feed pump and into the boiler.

Wrought Iron Condensate Return Lines Save 18 Replacement Jobs in 6 Years

When R. N. Williamson, Plant Engineer at Columbia Steel and Shafting Company, decided to install Wrought Iron condensate return lines, he saved himself eighteen replacement jobs in the six years the Wrought Iron piping has been installed. Steel pipe previously used failed on the average of every three to four months, pushing maintenance costs completely out of line.

Six years ago, Mr. Williamson discussed this problem with Byers engineers, and decided to install Byers Wrought Iron pipe. As of today, there have been no failures in the condensate return system, and of course, no maintenance costs, for which Mr. Williamson is very much pleased.

In this plant, steam is used for both heating and pickling. Three 250 hp gas-fired boilers supply 18,000 pounds of steam per hour. Condensate is returned to the boiler at pressures of 55 to 60 psi. Due to the varying pH of the condensate, the system had a real corrosion problem, but the use of Wrought Iron piping has it well under control.

Byers 4-D Wrought Iron pipe has a built-in corrosion resistance that stands up to the most difficult jobs. Why not find out how Byers can save you time and money—use the coupon.

Byers PVC Pipe Handles 98% Sulphuric Acid With Ease; Stainless Steel Patched Four Times in First Month

Falcon Chemical Corporation of Lake Charles, La., has replaced stainless steel with Byers PVC (polyvinyl Chloride) pipe for a sulphuric acid mixing header in which 98 percent sulphuric acid is mixed with water to produce 5 percent sulphuric acid in solution.

After the first month of operation, the original 316 stainless steel mixing header had been patched heavily —with some sections having four patches, one over another. Since the PVC pipe was installed on October 1, 1959, there has been no trouble.

One of the factors which led to the use of PVC was a general heating difficulty during start-up. Use of PVC helped eliminate this problem, since polyvinyl chloride has low thermal conductivity. Also, the concentrated sulphuric acid was injected closer to the header's center. Operating pressure and temperature, estimated at 60 pounds and 100 degrees Fahrenheit maximum, fell within range limits of PVC.

The installation consists of 2-inch diameter pipe for water service, 6-inch diameter pipe for the header and 1½-inch diameter pipe for 5 percent sulphuric acid discharge. All were schedule 80 PVC pipe.

Recent inspection indicated the PVC still in original condition. At no time, since original hydrostatic testing, has leaking been experienced.

Byers PVC pipe, because of its resistance to corrosion and its ability to withstand abrasion, can solve similar problems for you—for detailed information, use the coupon.

A. M. BYERS COMPANY

PIPE PRODUCTS: Wrought Iron • PVC • Steel
ROLLED PRODUCTS: Plates, Billets and Bars • Wrought Iron, Stainless and Alloy Steel

A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.
Please send data on items checked:
☐ Steam Condensate Report ☐ PVC Pipe Catalog
Name_____ Title_____
Company_____
Address_____

Problems of Air Purification and Odor Control

This is DOREX
...it SOLVES all these

C CELL

H CANISTER

PL GAS ADSORBER

AIR IMPROVER

To most of industry's odor abatement, odor control, and air recovery problems, a Dorex product is the most effective, most economical solution.

By completely adsorbing air-entrained odorous, gaseous, and vaporous impurities, Dorex solves the serious air pollution problems plaguing industry, business, and the general public: purification of severely contaminated intake air; purification of recirculated air; purification of contaminated exhaust air. Thirty years of research, development, and application guarantee it. Write for literature that describes how Dorex products illustrated at the left function in each application below. If yours is a problem not mentioned, describe it to us and we'll provide specific recommendations.

- Purifies intake air before it is admitted to areas that must remain free of foreign odors (food and drink processing, testing, etc.).
- Purges exhaust air of contaminants before it is emitted to outside (animal research labs, etc.).
- Purges compressed air intake of oil vapors and gases.
- Eliminates offensive food odors of cafeterias, other dining areas.
- Eliminates offensive odors of locker and rest rooms.
- Greatly reduces amount of outside air required by air conditioning system.
- Permits recirculation of fume-free air in confined areas (crane cabs of steel plants, e.g.).
- Protects delicate equipment, nearby office personnel from injurious effects of highly corrosive chlorine, sulphur gases (e.g., paper mills, etc.).
- Accomplishes emergency removal of toxic gases (nuclear conditions, etc.).
- Purifies outside air, possibly contaminated by neighboring industry, before it is taken into the air conditioning system.

CONNOR.. for Constant Comfort Conditions

Request copies of Bulletin 108A and "Air Conservation Engineering"

CONNOR ENGINEERING CORPORATION

dorex®

CONNOR ENGINEERING CORPORATION

DANBURY • CONNECTICUT

... the most experienced professionals in air recovery and purification

Begins on page 256

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

322—Dumping containers. Brochure on containers (to 12 cu. yd.) for handling waste materials. Dempster Bros.

323—Storage racks. Catalog gives facts on slide-and-lock adjustable storage racks. American Metal Products Co.

324—Steel shelving. Fact-packed catalog on rapidly assembled shelving. No bolts needed. Borroughs Mfg. Co.

325—Storage racks. Catalogs 107F and 111F give capacities, weights, dimensions. Bernard Gloekler North East Co.

326—Pressuregrip. Bulletin V-102 gives complete facts on air-pressure vacuum gripper. Whiting Corp.

327—Containers. Catalog lists line of containers made of tough vulcanized fiber. National Vulcanized Fibre Co.

328—Plastic containers. This brochure has information on one-piece molded plastic containers. G. B. Lewis Co.

MAINTENANCE

329—Paint. Bulletin P-57 on aluminum paint for wood or metal surfaces, damp or dry. The Wilbur & Williams Co.

330—Engineered maintenance. This free booklet outlines benefits of programed housekeeping. Puritan Chemical Co.

331—Paint. "Quick Reference Painting Guide" and "How to Reduce Painting Costs." Barreled Sunlight Paint Co.

332—Flexible pipe joints. Bulletin 805 on joints ⅜ to 4 in. O.D., lengths to 36 in. Marman Div., Aeroquip.

333—Paint. Bulletin, "CORLAR Epoxy Chemical-Resistant Enamel." Six colors. E. I. du Pont de Nemours & Co.

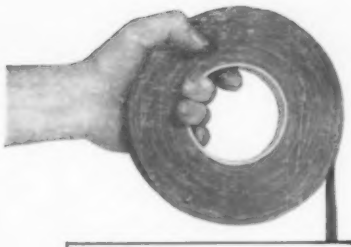
334—Coatings. Technical bulletin, "IMLAR Vinyl Coatings" which protect against severe acids. Du Pont Co.

335—Flooring compound. Brochure FC-100 has complete data on liquid polymer-base mortars. Thiokol Chemical Corp.

336—Paint. "New Color Horizons Systems" features 110 color standards, 69 photo applications. Rust-Oleum Corp.

337—Epoxy coatings. Literature on coatings for metal, wood, masonry protection. Hauger-Beegle Associates.

Turn the page



FLAME-RESISTANT

Arno DUCTAPE

FOR DUCTS AND INSULATION

- ✓ Complies with all building codes for flame-resistant duct tapes.
- ✓ Self-adhesive . . . sticks to any duct material or insulation.
- ✓ Will not support flame . . . holds firmly at high temperatures.
- ✓ Nothing to mix . . . saves labor.
- ✓ Vaporproof . . . waterproof.
- ✓ Meets ASTM standards.

Write for **FREE** test sample!

ARNO ADHESIVE TAPES, INC.
Dr. Scholl's Adhesive Tape Division
5205 Ohio St., Michigan City, Ind.

For more facts Circle 564 on Reader Service Card

How to select the right All-Metal Flexible Hose for your application

The NEW *Universal* CATALOG ID-100E

illustrates and describes a wide range of All-Metal Flexible Hose and Assemblies to satisfy practically any need you may have including applications subject to Temperature, Pressure, Vacuum, Vibration, Alignment, Chemicals, Highly Surging Liquids, or abrasive materials.

Our engineering service will help you find the right hose for your application.

WRITE for your Catalog ID-100E copy.

QUALITY... Factory Assembled and Tested *All-Metal* Flexible Hose Products

Universal METAL HOSE CO.

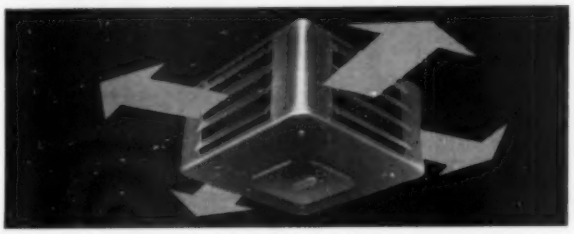
2147 South Kedzie Avenue, Chicago 23, Ill.

For more facts Circle 565 on Reader Service Card

Which is best for your job?

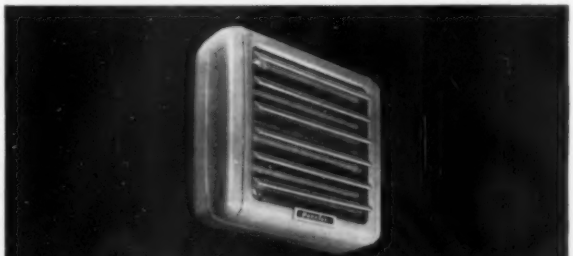
CARRIER UNIT HEATERS

for steam and hot water heating systems!



4-way discharge model (46S) "Clover Leaf" pattern can discharge air in as many as four directions at once. Using all four outlets, the largest Carrier unit can heat a room over 100 feet square. Without changing outlets or adding accessories, these units can be used to heat L, T, I or square-shaped areas. Suspension type, for use with high or low pressure steam or forced hot water. Eight sizes from 55,000 to 600,000 Btuh.

Vertical discharge model (46SE) For economical heating in spaces with high ceilings or where "clear span" areas are required. Uses high or low pressure steam or forced hot water. In 15 sizes from 44,000 to 1,000,000 Btuh with standard or low temperature rise coils. Available in three outlet types: adjustable cone, adjustable radial diffuser and cone anemostat.

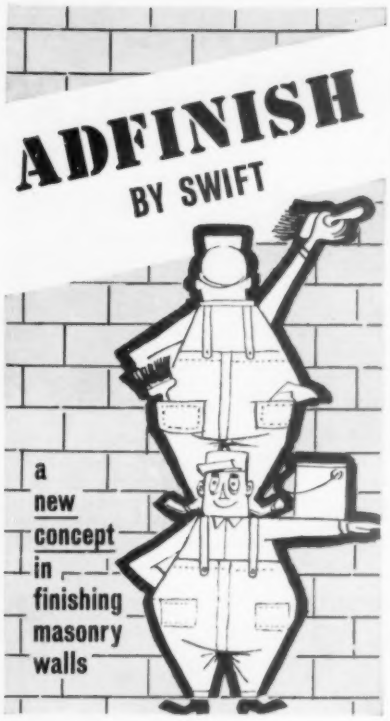


Horizontal discharge model (46U) Smart appearance and high efficiency are combined in this propeller fan unit. For high or low pressure steam or forced hot water. Single row coil with deep, smooth fins delivers maximum heat transfer, offers less air resistance, reduces power consumption. In ten sizes from 13,000 to 200,000 Btuh.

For information, call the Carrier representative listed in your Classified Telephone Directory under "Heaters—Unit." Ask for Catalogue 46-106. Other equipment in Carrier's heating line-up includes Heating and Ventilating Units for steam and hot water, and Gas-fired Unit Heaters and Duct Furnaces. Carrier Air Conditioning Company, Syracuse 1, New York.

Carrier ***Air Conditioning Company***

For more facts Circle 566 on Reader Service Card



BEAUTIFY AND PROTECT MASONRY SURFACES

Adfinish is a self-curing adhesive coating with outstanding wearing characteristics for finishing exterior or interior masonry surfaces. Easily applied by brush, spray or roller, Adfinish beautifies and protects, actually becomes part of the surface. Resistant to chemicals, moisture and vermin as well as fire retardant, Adfinish is an excellent finish for:

Poured concrete
Concrete block
Brick
All masonry surfaces

Adfinish comes in smooth or textured finishes to suit your requirements. Three colors • Brilliant White • Bright Yellow • Pearl Gray.

Return the coupon for details on a trial order.

Swift ADHESIVES

106TH YEAR

JUST CLIP TO LETTERHEAD AND MAIL

AD-13

Swift & Company
Adhesive Products Department
Chicago 9, Illinois

☐ Send bulletins on ADFINISH

☐ Send information on trial order

Name_____

Begins on page 256

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

338—Adhesive coating. Bulletins on self-curing coating for finishing masonry walls. Three colors. Swift & Co.

339—Molded packings. Catalog MP on packing for presses, rubber molding, and other uses. Greene, Tweed & Co.

340—Paint. Booklet, "Color Dynamics," tells what it is, how it's used. Paint Div., Pittsburgh Plate Glass Co.

341—Floor sweeper. Literature and specifications on new Model 4400 sweeper. Wilshire Power Sweeper Co.

342—Blower-suction cleaner. New bulletin gives all the facts on handy portable cleaners. Clements Mfg. Co.

343—Floor sweeper. Bulletin describes how new Model "85" slashes sweeping costs. G. H. Tennant Co.

BUILDING

344—Complete buildings. Detailed literature describes steel buildings in choice of 10 colors. Stran-Steel Corp.

345—Plant sites. Here's information on services available in Upstate, New York. Niagara Mohawk Power Corp.

346—Floor surfacer. Data on polyurethane bonding resin non-slip floor surfacer. Mine Safety Appliances Co.

PLANT SERVICES

347—Waste receptacles. Catalog lists full line, including Sani-Can step-on receptacles. Bennett Mfg. Co.

348—Dust filter. All about dual dust and fume exhaust and incoming air filter. Western Precipitation.

349—Water coolers. Free, illustrated booklet details maker's complete line of coolers. The Ebco Mfg. Co.

350—Dust collectors. Here's basic information for selecting right type from more than 50 models. Aget Mfg. Co.

351—Air filters. Bulletin 108A and "Air Conservation Engineering" on air purification. Connor Engineering Corp.

352—Intercom system. Free booklet gives complete facts on cost-saving intercommunication system. Executone.

Turn the page

Can Save You Thousands

His real name is "SERVIS RECORDER"— an instrument that keeps track of what machines or lift trucks are doing 24 hours a day. Every stop and every start are permanently recorded. You get an exact record of total productive time and non-productive time of any machine. Now you can pin-point inefficiency quickly — and the cost is peanuts!

Mechanical Models attach to machine.

Electrical Models may be placed in plant office.

Write for folder.

THE SERVICE RECORDER COMPANY

1013C ROCKWELL AVE. • CLEVELAND 14, OHIO

IF YOU BUY THESE
TO IDENTIFY
YOUR PRODUCT

New folder illustrates examples from every industry of profitable, effective product and package identification by Markem machines. Write for your free copy.

. . . MAKING YOUR OWN LABELS
or DIRECT PRODUCTION MARKING
may save you
thousands of dollars
and delays every year

Using labels, decals, transfers, tickets, tags, nameplates or handstamps to identify or decorate your products and packages may mean spending far more money and time than you need — and getting less than perfect product and package identification. In contrast, consider these natural advantages of *making your own labels* or *direct marking* as needed with a flexible, efficient production machine in your *own* plant:

. . . you automatically identify or decorate *as production requires*, with *complete* information in a *single* low cost label or direct print

. . . you cut your *investment* in label inventory . . . and eliminate waste from obsolescence

. . . you achieve *attractive and completely informative* product and package identification . . . that helps the buyer, the user, and the person who reorders

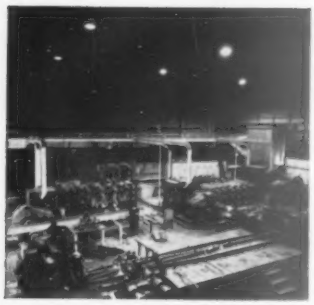
. . . you're *independent of outside sources* and you avoid inconvenience when new identification is needed . . . you can change part or all of the imprint in seconds

To get specific cost-saving recommendations and figures, call the Markem Technical Representative near you or write the main office. We will describe the particular combination of Markem machine, type, specialty ink and operating method to give you highest quality product and package identification — at the *lowest possible cost.*
Markem Machine Co., Keene 18, N. H.

MARKEM

HELPS YOUR PRODUCT SPEAK FOR ITSELF

Wheelabrator ultrafiltration provides air cleaner than you breathe



In this mill room, a Wheelabrator Ultra-Filtration® unit has eliminated the cost of 24 man-hours of maintenance labor a week in upkeep of 3 roughing mill drive motors.

A demonstration of WHEELABRATOR'S

VITAL VALUES

Air that's pure—really pure—is vital to the operation of steel mill drive motors. And ultimate purity of the filtered air is one of the Vital Values you get with Wheelabrator Air Filters. At a prominent steel mill, installation of Wheelabrator Ultra-Filtration to provide clean air to three drive motors totaling 2,200 h.p. has virtually eliminated weekly motor maintenance attention, saving $3,120.00 in direct labor cost alone per year. Added to this saving, mill room down time costing $6,000.00 annually due to motor trouble has been avoided. Wheelabrator Ultra-Filtration provides the air purity required, at a cost far lower than many systems offering less efficiency. Get the whole story of these vital savings. Write today for information.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR AIR FILTRATION

WHEELABRATOR CORPORATION, 374 S. Byrkit St., Mishawaka, Indiana,
In Canada, WHEELABRATOR CORP. of Canada, Ltd., P.O. Box 490, Scarborough, Ont.

Begins on page 256

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

353—Safety lenses. Safety portfolio, "Helpful Hints for the Man Responsible for Safety." Bausch & Lomb, Inc.

354—Make-up air system. Booklet gives facts and advantages of this system. Sturtevant Div., Westinghouse Electric Corp.

355—Two-way radio. Full details on all-transistor model and Duo-Com 100 or 100S models. Osborne Electronics Corp.

356—Activated charcoal. Literature T-366 covers filtering agent for home and commercial filters. Barnebey-Cheney.

357—Automated food service. Complete data on fully automated food service by machine. Automatic Canteen Co.

358—Valves. Catalog 59-SS lists line of steel valves in types and alloys to satisfy most needs. Jenkins Bros.

359—Fans. Bulletin AFF-61 covers axial flow fans for exhaust or ventilation service. L. J. Wing Mfg. Co.

360—Power roof ventilators. Bulletin PRV-61 on units—direct-connected or belt-driven motors. L. J. Wing Mfg. Co.

361—Fans. Bulletin WSF-61 provides data on wall or window wingfoil power-driven types. L. J. Wing Mfg. Co.

362—Pipe, PVC. Catalog gives details on polyvinyl pipe for use in high corrosive applications. A. M. Byers Co.

363—Pipe, wrought iron. Steam Condensate Report shows corrosion-resistant properties and economies. A. M. Byers Co.

364—Compressor. Bulletin WB-10 gives complete mechanical data and cost-saving features. Gardner-Denver Co.

365—Dunking stations. Brochures on 20 models of cigarette disposal units. Standard Industrial Products Co.

366—Measuring tapes. Folder 5807 introduces 6- and 12-ft. tapes in holsters with belt clips. Evans Rule Co.

367—Plant security. Literature on centralized control panel, alarm for plant security. Minneapolis-Honeywell Co.

368—Aftercooler. Bulletin 130 gives complete data on aftercooler for compressed air, gases. Niagara Blower Co.

369—Electrowriter system. Here's information on electric transmission of written messages. Comptometer Corp.

IT'S 2 TO 1 IN YOUR FAVOR...

If You Build That New Plant In Bristol, Virginia-Tennessee

- Famous Twin Cities offer dual advantages. Choose Virginia or Tennessee, and you can have any size facility, from 25,000 to 500,000 square feet, built to your specifications with full financing. Funds available to financially responsible firms under Tennessee Bond Act or Virginia Industrial Development Corporation.
- No site-hunting. Industrial Land already set aside and is immediately available on either side of the state line.
- Economical power. Three nearby TVA installations provide abundant electricity and water, rich bituminous coal fields in trade area.
- Trained Labor. Century of industrialization has provided pool of experienced workers in light metals, electronics, textiles, woodworking, leather goods, heavy machinery.
- You'll like the Twin Cities, others do. Raytheon Manufacturing Company, Sperry Farragut Company, Monroe Calculating Machine Company, Burlington Industries among many who enjoy benefits of healthy industrial climate.

For Complete Information Call or Write

M. C. Gravely, Jr., Executive Vice President

BRISTOL INDUSTRIAL DEVELOPMENT CORPORATION

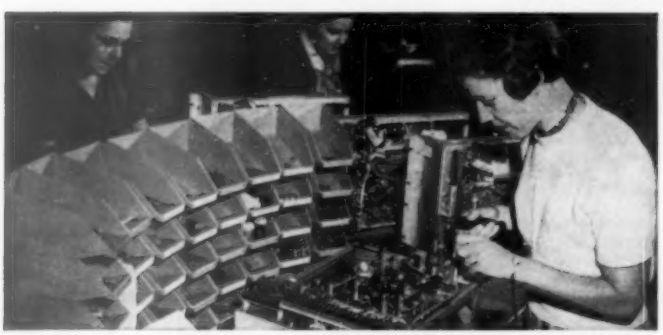
Inquiries Held Confidential

Bristol, Virginia-Tennessee **Phone NOrth 9-2141**

For more facts Circle 571 on Reader Service Card

AT RAYTHEON:

Stackbin's all-plastic bins provide fast, flexible assembly stations



New, non-corrosive, easily cleaned... stack and restack securely in tight semi-circular arrangement to suit changing requirements . . . molded card holders on fronts for fast, easy parts identification . . . sloping bottom for easy parts accessibility.

Custom fitting, plastic insert doubles the number of different components you can handle without increasing space requirement.

FREE FACTS Write for new product bulletin and prices. All Stackbin products sold direct.

STACKBIN CORP. 1089 Main St., Pawtucket, R. I.

Mfgd. and sold in Canada exclusively by Wickware-Stackbin, Ltd., Perth

STACKBIN® SYSTEM *"Stacked and Still Accessible"*

"THIS LUBRICANT PRACTICALLY ELIMINATED BEARING REPLACEMENTS"

Says- C. O. SPARKS, INC.
& Mundo Engineering Co. of Los Angeles, Calif.

"Prior to using LUBRIPLATE, we were replacing shaker screen bearings within 60 to 120 days due to lack of or faulty lubrication. Since we started using LUBRIPLATE seven years ago, we have only replaced two shaker screen bearings and these because of natural wear. We now use LUBRIPLATE for general lubrication throughout our plant."

W. T. Ellington, President
Mundo Engineering Co.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

Circle 573 on Reader Service Card

For more facts Circle 572 on Reader Service Card

WHO USES *Rubbair*® the true door . . . not a curtain. *Doors?*

A Rubbair Door installation at the warehouse of S. Kann & Sons Company, Hyattsville, Maryland

THE S. KANN SONS CO.
Washington, D. C.

READ THIS ACTUAL CASE HISTORY . . .

In response to your letter of March 25, we are happy to inform you that we are very pleased with the Rubbair Doors that were installed about 3 years ago in our warehouse at 5620 Ager Rd., W. Hyattsville, Md. They have held up well and have satisfactorily performed their function of keeping cold air out of the building while allowing easy passage of merchandise through the doorways. If we were to build a new warehouse, we would duplicate the Rubbair door installation.

Sincerely yours,
B. B. Bergunder, Jr.
Vice President

RUBBAIR DOORS flex on impact because of their construction. They absorb high traffic punishment from the constant pounding of fork trucks, material handling equipment, packing boxes and cases. The 'flex' and 'bounce' features of RUBBAIR DOORS give you longer, factory-tested door life and extremely low maintenance costs.

RUBBAIR DOORS assure trouble free operation with . . .

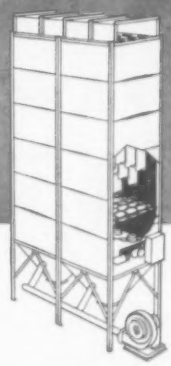
- **Flexible Construction**
- **Rugged V-Cam Hinges**
- **Scuff-resistant Wear Panels**
- **Shatter-proof Windows**
- **Safety Cushion Nose**
- **Positive Air Seals**

If you have an industrial or warehouse door problem, let us help you solve it. Write us about it, or send for free catalog.

MANUFACTURING CO. INC.
RUBBAIR® DOOR DIVISION
60 Regent Street
Cambridge 40, Mass.

Distributorships available in protected territories.

268 **For more facts Circle 574 on Reader Service Card**



Clears your dust problems with 99%-PLUS efficiency!

DUALAIRE
Jet-Cleaned Filter

In your operation, if filtration is judged the best way to clean incoming air — or remove dust and fumes from exhaust air and gas — a **Dualaire** by Western Precipitation will do the job best.

Constantly efficient . . . at virtually 100% . . . the **Dualaire** cleans itself — without jarring or rapping. It uses the patented Hersey reverse air-jet method — assuring minimum maintenance and economical operation.

WRITE FOR MORE INFORMATION to Western Precipitation, 1000 W. 9th St., Los Angeles 54, Calif. (In Canada, write 8285 Mountain Sights Ave., Montreal, P. Q.)

DUST AND FUME CONTROL SINCE 1907

WESTERN PRECIPITATION
DIVISION OF JOY MANUFACTURING COMPANY

For more facts Circle 575 on Reader Service Card

FINGER-TIP COMMUNICATION

the DUO-COM 100 WALKIE-TALKIE

Osborne's DUO-COM 100 pocket size *walkie-talkie* . . . a completely self contained transmitter and receiver that weighs only 20 ounces. No license or permits required . . . may be operated by anyone regardless of age or citizenship with dependable communication ranges up to 5 miles. Operates for pennies and is priced at only **$99.50** each or the DUO-COM 100S with an efficient squelch control at **$119.50** each.

The perfect companion . . . the OSBORNE 300 "Class D" base station at **$149.50.**

OSBORNE ELECTRONICS CORP. Dept. A5
13105 S. Crenshaw Blvd. • Hawthorne, Calif.

Please rush me complete details on your ☐ DUO-COM 100 ☐ DUO-COM 100S ☐ OSBORNE 300

NAME _____

ADDRESS _____

CITY _____ ZONE ___ STATE _____

For more facts Circle 576 on Reader Service Card

Here is a plan to help you

REDUCE SUFFERING AND TRAGEDY

With it, your company can SAVE PRECIOUS LIVES, *while* CUTTING COSTS DUE TO ABSENTEEISM *by as much as 1/3 to 1/2!*

Together, American management and labor have done a remarkable job of reducing the incidence of industrial accidents. In-plant safety campaigns have been so effective that today it is *nonwork accidents* that cause the bulk of lost lives and manhours in our economy.

The National Safety Council has developed a plan to reduce these accidents. Not only will it save lives and prevent crippling injuries, but it will add significantly to the efficiency and net profits of companies which put it into operation.

Let's say you're an average company or corporate unit doing $1 million in sales a year. Your net is around $73,000. National Safety Council figures show that the average nonwork accident costs employers about $72. (You can determine *your* costs with the Council's new nonwork accident report system.) Ten such accidents can cost $720—or about 1% of your net profit. Prevent those accidents and you can *add 1% to your net!* Prevent twenty—and add 2% to net!

Experience shows that a reduction of nonwork accidents by 30% is possible! One large company with an excellent in-plant safety record has *cut nonwork accidents by 1/3* with its off-the-job safety program! It's employee's rate for motor vehicle fatalities stands *85% below rate for all U.S. workers!* And its already low *in-plant accident rate came down 50 per cent!*

Here is a rewarding endeavor that pays immeasurable dividends in human and employee relations—as well as an important untapped source for cost control. You can institute this kind of program in your company. Send the coupon for a copy of our booklet "The Challenge to Management of Off-the-Job Accidents." It will show you how to determine your non-work accident costs, as well as many tested ways to reduce this steady waste of lives and profits. Send the coupon today.

I Howard Pyle

HOWARD PYLE
President, The National Safety Council

Published to save lives
in cooperation with
The Advertising Council and
The National Safety Council

SUPPORT YOUR LOCAL SAFETY ORGANIZATION

THE NATIONAL SAFETY COUNCIL
425 NORTH MICHIGAN AVENUE, CHICAGO 11, ILL.

Please send me a copy of your booklet "The Challenge to Management of Off-the-Job Accidents." I want to learn how my company can save lives while cutting costs.

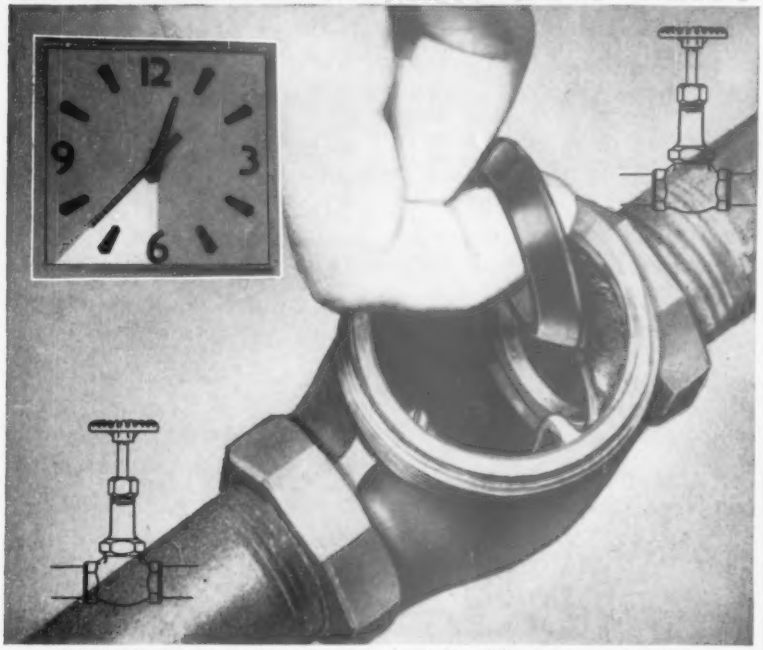
NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

Only 7 to 10 Minutes to Renew Service Life of New Gate Valve



Patented development assures replacement of seat ring while valve remains installed.

Without removing the valve body from the line, you replace the nickel-alloy seat rings in Fairbanks new patented Renewable Seat Ring Gate Valves. In 7 to 10 minutes, from the time the line is shut down until it is put back into operation, you have given a new service life, a new life of dependable tight closure to your valve.

Just 7 to 10 minutes of your maintenance man's time — only 7 to 10 minutes of "down-time" on your steam, water or process piping lines — and you have the equivalent of a new valve in the line. Think of the savings: where once at least one hour, under the most ideal conditions, was required to replace a gate valve in the line, the job is now accomplished in from 7 to 10 minutes.

Field tested for over two years, under all conditions from steam to corrosive liquids, the revolutionary new Fairbanks Renewable Seat Ring Bronze Gate Valve has proven completely satisfactory — absolutely dependable.

Made with either rising stem or non-rising stem construction in ½",¾",1", 1¼", 1½" and 2" sizes, the Fairbanks Renewable Seat Ring Bronze Gate Valves are recommended for severe service conditions on 200 lb. steam pressure at 550 degrees F., 400 lb. water, oil or gas pressure — non-shock — lines requiring full flow and subject to frequent operation. Nickel alloy seat rings and wedge make the valves particularly tough and corrosion resistant.

YOURS ON REQUEST: Illustrated, descriptive folder gives complete information on Fairbanks Renewable Seat Ring Gate Valve with details and specifications. Yours without charge. Write today.

1. Union Bonnet removed. Retaining screw loosened with ordinary screwdriver.

2. Finger hooks inside nickel alloy seat ring. Seat ring lifts out of valve body.

3. New seat ring is inserted. Retaining screw tightened. Bonnet replaced.

THE **Fairbanks** COMPANY
393 Lafayette Street, New York 3, N. Y.
Branches:
New York 3 • Boston 10 • Pittsburgh 22 • Rome, Ga.
Valves • Trucks • Casters • Wheels • Dart & "PIC" Unions

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A PICTURE OF WASTED PAINT. The overspray you see is typical of most old-fashioned spray systems. Fifty per cent or more of the paint never reaches the object to be painted at all.

WITH NORDSON AIRLESS. The same product being sprayed by the same man; but, this time, little or no overspray — paint waste cut 25 per cent or more.

With an ordinary spray system, 600 parts of air are needed to atomize one part of paint. When the spray gun is triggered, the mass of air must go somewhere and it carries with it clouds of paint — much of which goes up the spray booth exhaust stack or settles where it is unwanted.

The Nordson Hot Airless System changes all that. *No* air is used for atomization so overspray is cut to a bare minimum. Important savings are made in both material and labor. Clean-up time is cut to the bone, housekeeping improved. We can show you how to cut painting costs and at the same time get better finish quality. Write for your free copy of the Nordson Hot Airless Spray Brochure.

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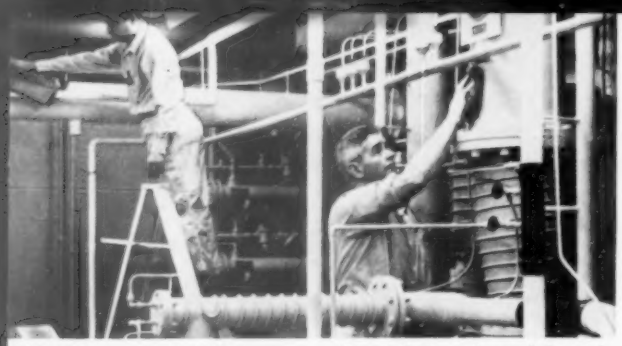
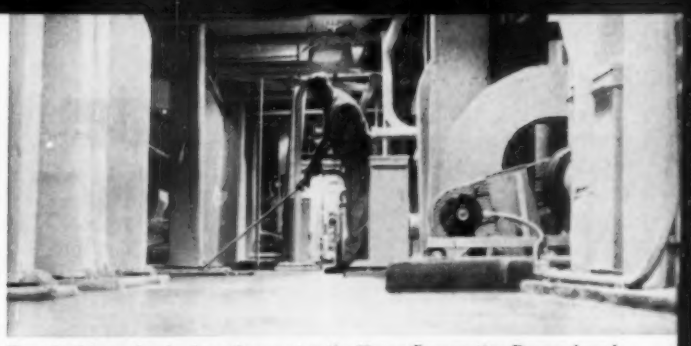


Advanced research in high-vacuum coating techniques is carried out in specially constructed laboratories in which special exhaust units discharge 100% of air-borne powder to the outside atmosphere. Cleaning with treated "KEX" cloths insures removal of clinging dust from all surfaces.



Even in this mechanized penthouse atop the Xerox Corporation Research and Engineering Center, dust control is vital. Besides cloths for cleaning apparatus, scientifically designed "KEX" Sweeping Tools with fitted, chemically treated covers pick up and hold dust from walls and floors.

Model and Primary shops occupy 14,000 square feet and are equipped with the latest in machine tools and measuring instruments. "KEX" brings to these areas an extremely high order of cleanliness, unattainable with all other cleaning systems the company tested.

More than a mile of crawlable air-duct space at Xerox plants is cleaned routinely using the "KEX" system of dust control. This system enabled the plant cleaning staff to cut by ½ the tested amount of dust in the plants. as well as cut cleaning time by 50%. XEROX is located in Rochester, N.Y.

NOW XEROX CORPORATION DOES IT WITH "KEX"

New Technique for Cleaning Industrial Plants Cuts Dust—and Work—50%

The boiler room, too, in the Xerox Research and Engineering Center is cleaned systematically and routinely using the specially treated towels for exacting dust control. All surfaces in the room are painted in color-coded glossy pastels to assist in maintenance and improve cleanliness.

To insure outstanding quality of photographic and photocopy papers in Xerox Corporation Photographic Paper plants, Xerox experimented with many cleaning processes to eliminate dust in manufacturing areas. KEX dust control system not only cut cleaning time by 50% but made possible a new set of even more exacting standards for the photographic paper products. Today this system is in use throughout all the company's offices and plants.

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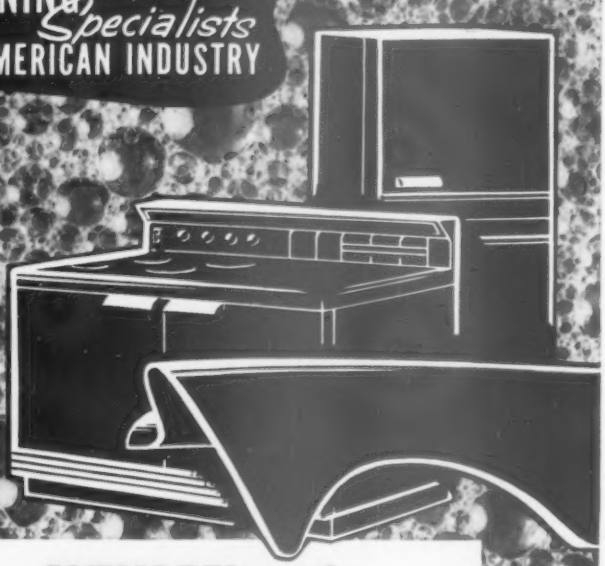

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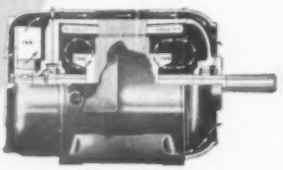

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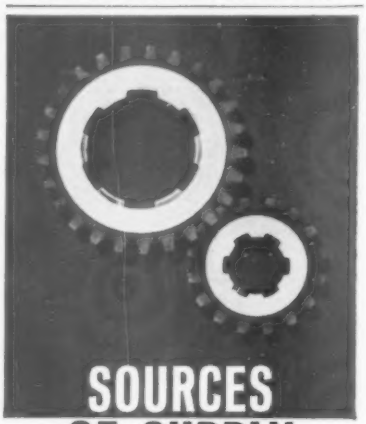

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Suppliers and sub-contractors in the Northern Plains can be pinpointed quickly by the Facilities Register, a unique electronic index of production facilities. Whether yours is a problem of finding new suppliers, contracting for idle machine time, shortening lines of supply, or obtaining better quality and service:

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Rapid outside temperature variations require reliable heating systems to protect delicate carnation plants. Here, a six-inch main line feeds off to two-inch feed lines. Over 34,000 ft of Spang Steel Pipe was used to provide overhead heating in four Denver greenhouses.

SPANG Steel Pipe installed in new type heating system at 4 Denver greenhouses

Until recently, greenhouse heating pipes were usually installed under growing benches. Flower growers believed that maximum root action could be obtained through alternately sprinkling the soil and drying it with heat from the pipes.

Today, in Denver, this has changed. In four new greenhouses in the Denver area, controlled air moisture provides just the right humidity throughout the greenhouse. And SPANG Steel Pipe has been installed *over* the growing areas to provide uniform steam-heat temperatures the year around.

Denver weather creates heat control problems

Raymond Petty, co-owner, Petty Greenhouse Construction Company, Denver, reports: "About 90% of greenhouse production here is in carnations, and these plants are very susceptible to cold weather. We get rapid temperature variations, and it takes an efficient and dependable heating system to protect the high investment in plants. We must guarantee a 50°F inside temperature at minus 10°F outside.

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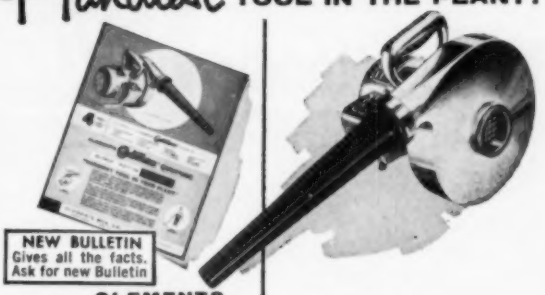

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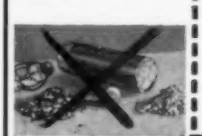

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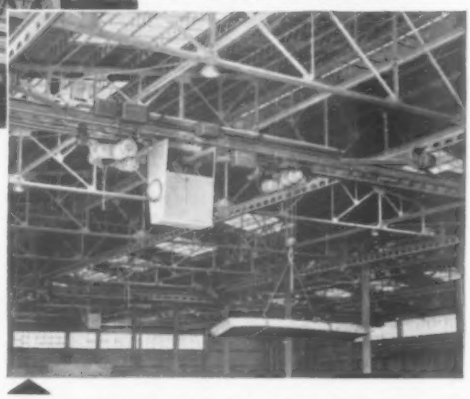
Cranes Handle MILLIONS OF POUNDS Monthly

Bundles of reinforcing rod are easily lifted out of storage with the Tramrail cranes and delivered to the forming area shown here. The crane illustrated also handles rod out of incoming railroad cars and delivers it to storage quickly. The crane has two electric hoists each of 5000 lbs. capacity. Crane span is 70 feet.

Cleveland Tramrail Cranes *Keep Going at High Pace in* LARGE TEXAS STRUCTURAL STEEL PLANT



Handling a heavy pack of steel plates. Aisleways are not of concern when Tramrail cranes are used; in fact, most usual aisle space can be devoted to storage and other purposes. The crane cabs were fabricated by Central Texas.

THERE is little idle time during a working day for the Cleveland Tramrail cranes at Central Texas Iron Works Co., Waco, Texas. Both of the cab-operated cranes in the Shear and Reinforcing Rod Storage Building generally handle 3,000,000 lbs. each of steel rod, plate and miscellaneous items per month. This means many lifts and much travel in all directions. Eight hours is the standard working day.

Central Texas is one of the largest structural steel fabricating companies in Texas. They fabricate beams, trusses, tanks, stacks, etc., also form concrete rod for buildings and bridges.

Central Texas recognizes the advantage of materials handling equipment designed and built by specialists in this field. For many years they have used a large number of Cleveland Tramrail hand-propelled cranes with electric hoists in an old fabrication area. The cranes illustrated here were installed in 1954, when they enlarged the plant. The Cleveland Tramrail equipment has proven a big factor in facilitating handling and has been very satisfactory.

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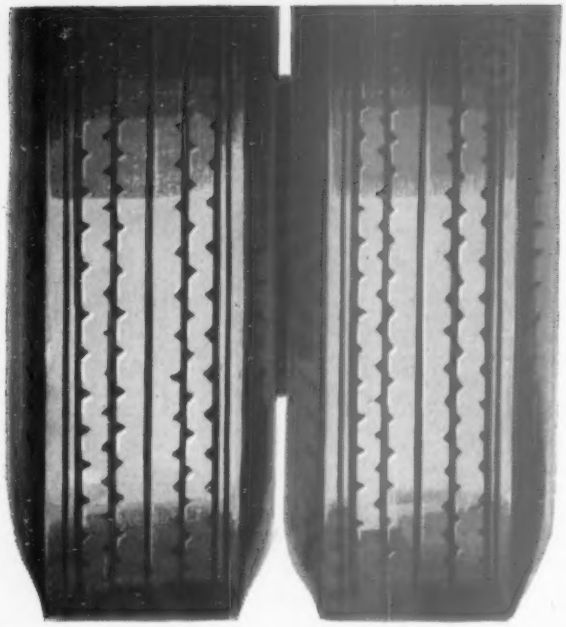

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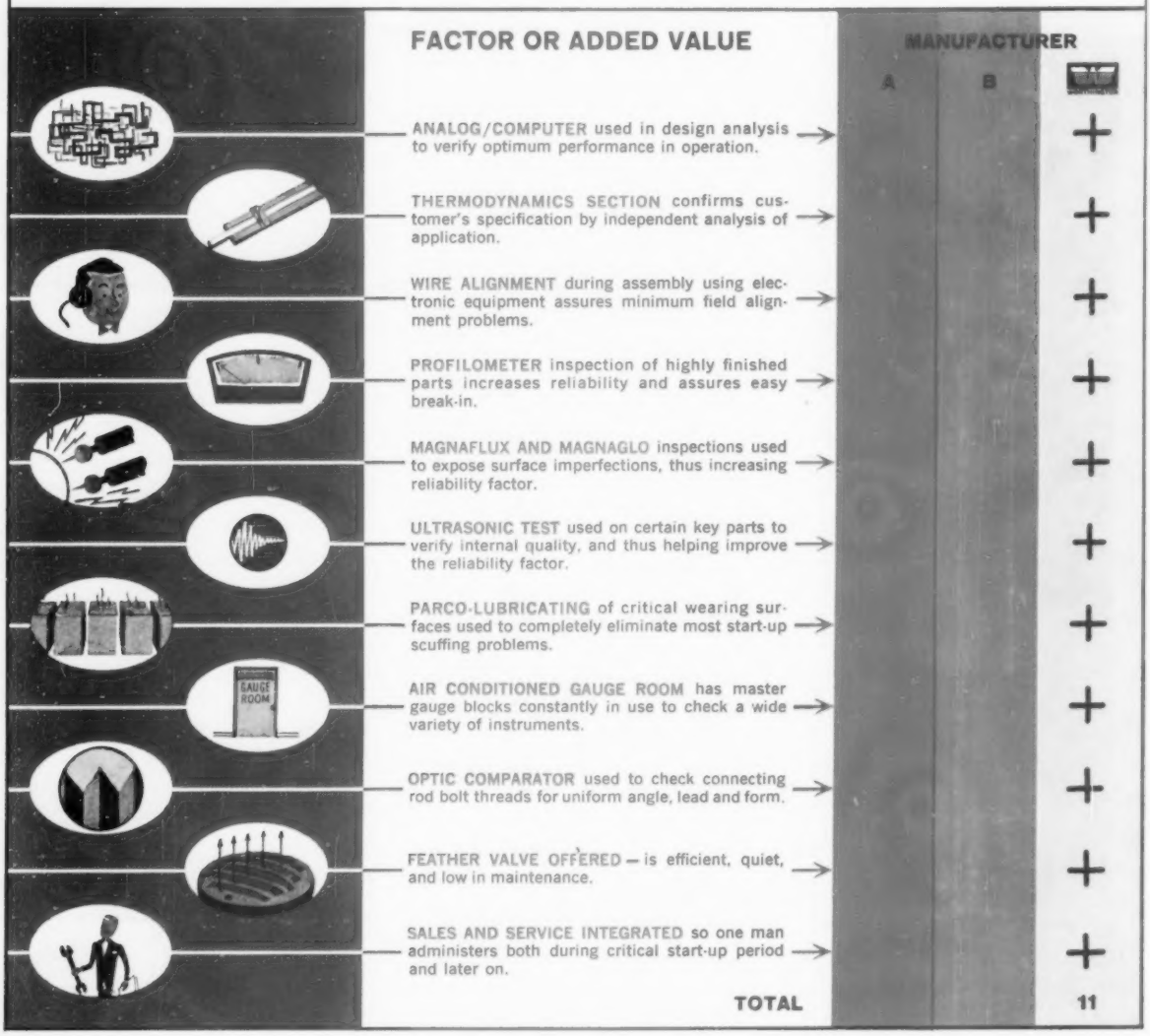
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